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TEST CENTRE digit FEBRUARY 2004

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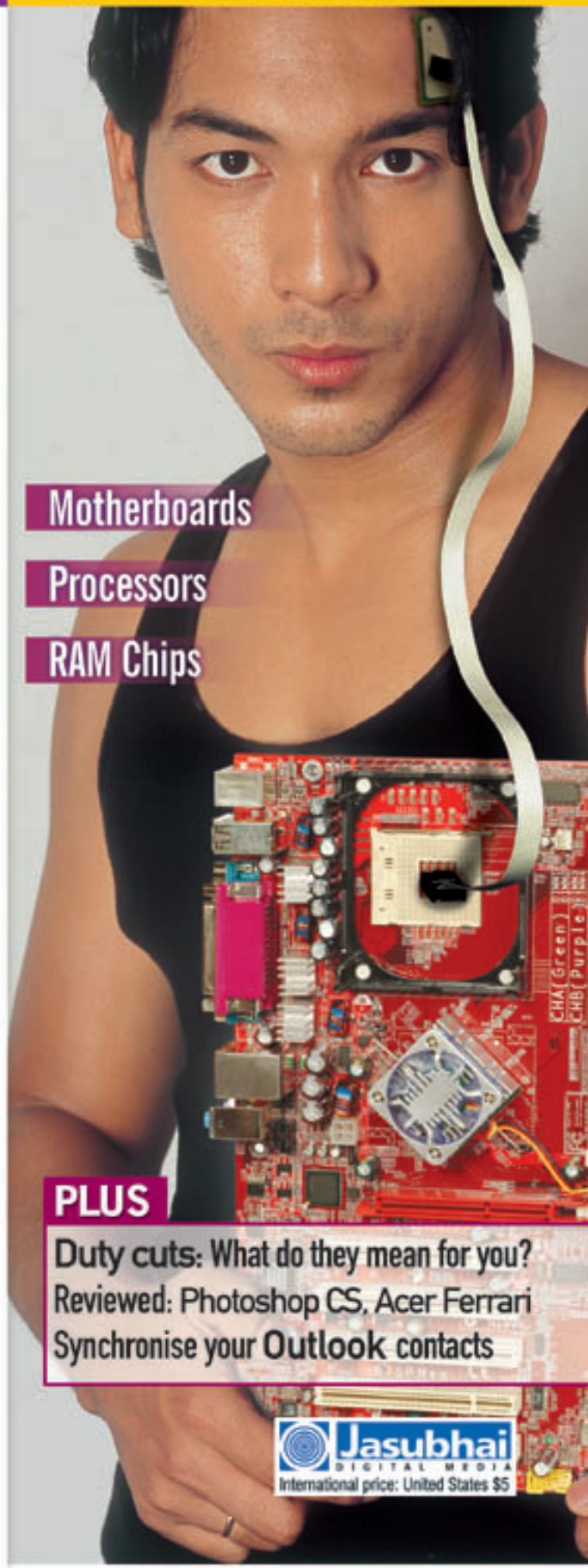
WikiWikiWeb: Discover the world's favourite collaborative site-building system

50 Search tips to find anything on the Web

P4 Extreme Edition vs Athlon FX-51



Motherboards

Processors

RAM Chips

PLUS

Duty cuts: What do they mean for you?
Reviewed: Photoshop CS, Acer Ferrari
Synchronise your **Outlook** contacts

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Finding Memo

A curious inversion of sorts happens when you have used a computer for a while. Discovering, or even creating new information, doesn't remain the most time consuming task. Instead, looking for already-existing information takes precedence.

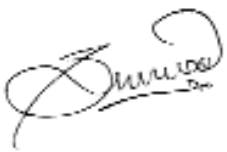
You truly "use a computer" only when everything you do is augmented by its capabilities-saving notes and memos, communication, tracking tasks and activity co-ordination, i.e., when you turn to a PC to store contact details, when you have an archive of all your snail-mail correspondence as word-processor documents. This dependence increases as you being using these devices to store digital photos, making them entertainment hubs with music libraries and have video streaming to your TV.

In the digital world, it is supposedly easier to find anything you want. Evidently, it is not. It's hard enough finding new things, but searching for a piece of information you know you have, in vast amounts of data, can be exceedingly frustrating.

A small hard disk keeps things under manageable limits, because you are forced to keep a tight leash, or risk running out of space quickly. However, these days, when it is *de rigeur* to have anywhere between 40 GB to 120 GB of personal data space, where does all that data go? Beyond a point, organising your documents, e-mails, Web site links and saved pages, crosses the point of diminishing returns-you either have a fastidiously organised directory tree with hundreds of folders that are a nightmare to navigate, or it all collapses to a couple of folders creating a mess you'd rather not look at.

When businesses first had gigabytes of data to manage, they turned to database servers with specialised data processing languages to create order out of the chaos. Unfortunately, we're still stuck with slow search tools, different accounts for e-mail, and even different kinds of files. The legacy paper-based metaphors represented by the desktop with files and folders, does nothing to improve upon paper-based limitations. When a digital yellow sticky note is the epitome of accessible task management, it speaks volumes about lack of progress.

But there is hope. A quick look around research circles reveals plenty of activity, with projects such as "Keeping Found Things Found" and "Stuff I've Seen", that are very encouraging. The primary factor holding back fast local searches, used to be lack of computing power. Now, here's where the gigahertz of idle processing power can finally be put to profitable use.



sumod_hajela@jasubhai.com

Sumod Hajela
Assistant Editor

"When a digital yellow sticky note is the epitome of accessible task management, it speaks volumes about lack of progress"

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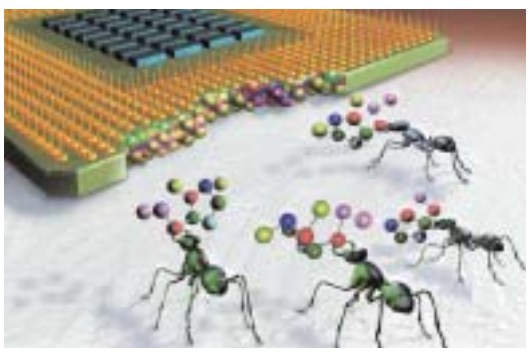

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Intellisync for Yahoo!
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Sight & Sound > Video > Codecs

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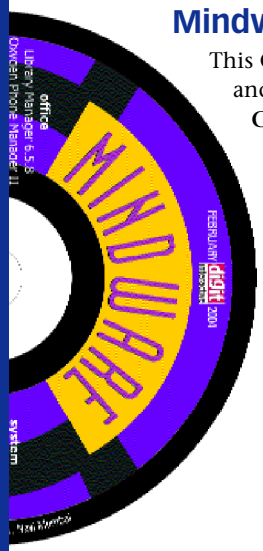

Mindware

This CD is a compilation of useful software across various categories and genres. You are sure to find something for everybody.

CuteMap 1.1 helps you make image maps for your HTML page

DivX bundle 5.1.1 will play the latest videos for you

Periodic brings the Periodic Table or elements to your desktop for easy reference

SurfGhost 1.7 will ensure that you don't leave footprints while surfing the Net

Winamp 5.01 aims to integrate the best of all current players

digit extra Sight & Sound

This month, savour some of the best audio and video-editing packages available

Create some catchy background music for your video with **Acid Xpress 3.0**

Use the mighty **Adobe Audition** for your audio-editing needs

Don't be limited in your audio-editing needs by using **SoundForge 7.0**

Blow away the audience by spicing up your video in **Adobe Premiere Pro**

Complexities scaring you from video-editing? Try **Vegas 4.0**

Playware

Bored with that drab PC of yours? Find on this CD, stuff to pamper yourself and your Windows

See if you are still that good at classics such as *Snake, Pac-Man* and others

Watch the latest movie trailers including *Spider-Man 2* and *Harry Potter and the Prisoner of Azkaban*

Listen to some funky new music from **The Harvard Din & Tonics** and others

Watch some informative **video tutorials** on **Adobe Photoshop** and **Adobe Premiere**

digit extra Blitzkrieg

Challenge yourself and the world with the latest and the best games around

Drive some of the fastest and coolest cars in the world in *NFS Underground.*

Prince of Persia was a super hit. Is *Prince of Persia: Sands of Time* a good followup? Decide with this video trailer

Bored with the regular *Quake* maps? Try the **Quake Map: Meat Pack**

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The much-neglected second-hand PC market is slowly gaining in popularity, owing to the practical no nonsense options that they offer...

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DIGIT FEBRUARY 2004

hypethesis

Aura Communications wireless headset

■ **What is it?**

It is a magnetic induction based hands-free headset for mobile phones. Unlike traditional wireless headsets, it has a limited range of just over a meter, and works on a single AA alkaline battery

■ **How does it work?**

The Aura uses a form of magnetic induction to transmit the signals from the phone to the headset, and vice versa. It works by changing a faint magnetic field between the base and the headset. Hence it does not use radio frequency (RF) to wirelessly transmit calls, unlike today's Bluetooth headsets.

■ **What does it do?**

The Aura headset provides a low cost alternative to Bluetooth headsets. The base unit interfaces with most current generation mobile phones, through the earphone socket. The single AA battery gives up to 25 hours of talk time, much more than Bluetooth headsets.

snapshot

Computer virus attacks cost the business world $55 billion in damages in 2003

Source: Trend Micro

Good-bye old cams

Kodak has decided to stop selling film-based cameras in USA, Canada and Western Europe, and will concentrate on pushing one-time use cameras in this region. However, it will continue to sell film-based cameras in other regions.

Kodak will focus on the high-volume digital camera market. According to InfoTrends Research Group, global film camera shipments this year will be 36 million units against 48 million in 2003. Digital camera shipments, on the other hand, will rise to 53 million in 2004, from 41 million units in 2003.

Kodak has identified India, China, Eastern Europe and Latin America as its core film-based camera markets. The company estimates there are 60 million Chinese consumers who have the purchasing power, but have not bought their first camera yet. However, Kodak will remain in the film business as 120 million film rolls are still sold ever year.

Google on Wall Street

Google's long-awaited Initial Public Offering (IPO) may be just around the corner. The still-privately held company has hired two leading investment banks—Morgan Stanley and Goldman Sachs—to spearhead their IPO process.

There is no formal announcement yet, but industry insiders believe the offering may take place around April this year, raising as much as $4 billion.

It is believed that only a third of Google's entire stock—expected to be worth $12 billion—is going to be put up in the IPO, so the owners would still control adequate stocks. Google also has a hand in Usenet archives, image searching, news aggregation, language services and recently acquired Blogger—the Web logging software company.

ILLUSTRATIONS: Mahesh Benkar

Spice*ing* the post

The old meets the new, the ancient meets the post-modern—Bangalore-based Spice Telecom could well believe it has started a new trend, thanks to its innovative tie-up with, hold your breath, the Postal Department. Customers can now just walk into their nearest post-office and buy prepaid mobile phone cards and refill coupons of all commonly issued denominations. Spice has introduced the service in Bangalore and Mysore, and will gradually be extended to more post offices in other post as demand picks up. Technology and communications, the synergy never looked better!

Microsoft in a new mood

Microsoft had earlier announced it would end extended support for Windows 98 and 98SE on January 16, 2004, and Windows Me on December 31, 2004. But, but, but... the company has realised that a lot of people in developing countries still use Windows 98 and Windows Me, and so it will continue supporting the operating systems till June 30, 2006.

Reports indicate that 90 per cent of all computer users across the world use Windows—20 per cent of which still use Windows 98. The company said the newer versions of Windows—Windows XP and Windows 2000—have a support lifecycle of seven years. Thus, by extending support for Windows 98 and Me, they are complying with current support policies.

■ AT&T Wireless, the third-largest US cellphone service provider is now on sale ■ HP's Linux products and services netted the company $2.5 billion in 2003

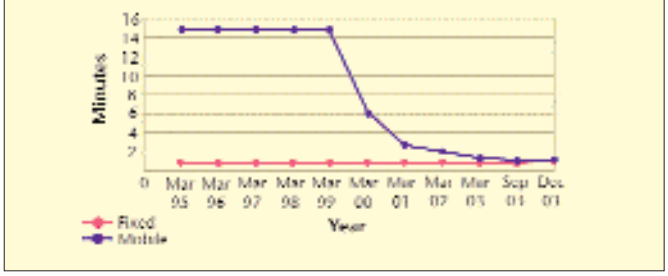
Tax that!

Canadian music lovers are in for a bit of a shock and surprise. The Copyright Board of Canada has decided to tax all hard drive-based digital music players to appease a long-standing grouse of musicians, song writers and record labels who are affected by the distribution of copyrighted music over P2P networks. And yes, the tax—as much as 25 Canadian dollars—will also be applicable on blank CDs and tapes, all of which will be passed to consumers.

MP3 player manufacturers such as Apple, Dell and HP are fighting this regulation, and retailers such as Wal-Mart Stores and Best Buy are joining up. Their argument relies on a stipulation in the Canadian regulation, which apparently allows for personal downloads over P2P networks—of even copyrighted material. Ironically, uploading copyrighted material is absolutely illegal! This new twist has all the makings of a face-off, with the Canadian Recording Industry Association claiming that downloading copyrighted material is illegal. It plans to challenge the decision, as well as hunt down file swappers in Canada.

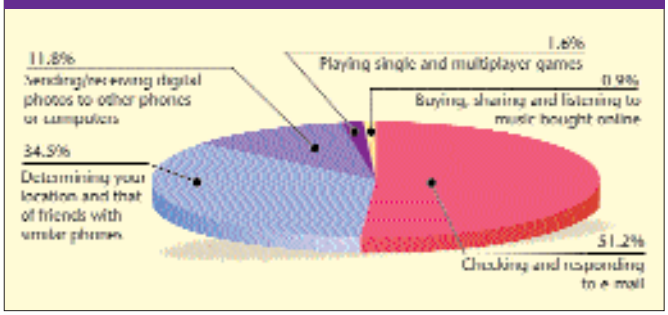
statattack

Call charges for 400 mins of use per month



Source: TRAI

Services most accessed from hand-held devices



Source: Brightmail Inc

INFOGRAPHICS: Sachin Dalvi

No WMA for HP's iPod

The HP iPod will not be able to play WMA files, belying reports that it was working with Apple to get WMA compatibility. This effectively means that all HP branded iPods will still only be able to play Apple's copy-protected secure format, based on the AAC (Advanced Audio Coding) format.

The iPod is linked to Apple's iTunes online music service, which, according to Apple, accounts for 70 per cent of all online music sales. While HP iPod consumers may not currently be able to hear their tunes in the WMA format, industry analysts say that it's possible that HP may work toward a technical fix to make WMAs playable. HP and Apple have strongly denied this so far.

Script your own dreams

In their heyday, the Everly Brothers sang, *"All I have to do is dream"*. Japan's Taraka Co perhaps took inspiration from that song to create their latest machine—a machine that creates custom dreams!

The Yumemi Kobo or 'dream workshop' looks at photos of what you want to dream of, lets you record a story line, and then you sleep.

Voice recordings, lights, music and smells direct users during REM (Rapid Eye Movement)—the period of sleep when humans dream. You are woken gently with light resembling sunlight, so that you can remember your dreams.

Taraka Co also made the Bowlingual and Meowlingual devices, which translate barks and meows from your pets.

redalert

W32/Swen@MM

Also called I-Worm.Swen (AVP), W32/Gibe.e@MM and Win32.HLLM.Gibe.2, this worm spreads via e-mail, network shares, KaZaA and IRC. It terminates various anti-virus and security applications, and contains its own SMTP engine. It copies itself to the Windows folder using a random name, and modifies various registry keys, disables regedit.exe and kills applications. Visit ***http://us.mcafee.com/virusInfo/default.asp?id=helpCenter&hcName=swen&cid=9060*** for more information.

Trojan.Xombe

This new Trojan—also known as Downloader-GJ and Troj/Dloader-L—is spreading over the Internet through e-mail. The 'From' address is ***windowsupdate@microsoft.com***, with the subject, 'Windows XP Service Pack 1 (Express) - Critical Update'. The message body poses as an update notification from Microsoft, with the security update as the attachment. The 4,096 byte attachment is called 'winxp_sp1.exe'. When executed, it downloads another program 'Mssvc-A', which uses your computer to launch DDoS attacks against Web sites. Microsoft says that it does not send security updates as attachments. Visit ***http://securityresponse.symantec.com/avcenter/venc/data/trojan.xombe.html*** for a patch.

snapshot

American **music fans paid** for, and downloaded, **30 million** tracks in **2003**

Source: CNET News

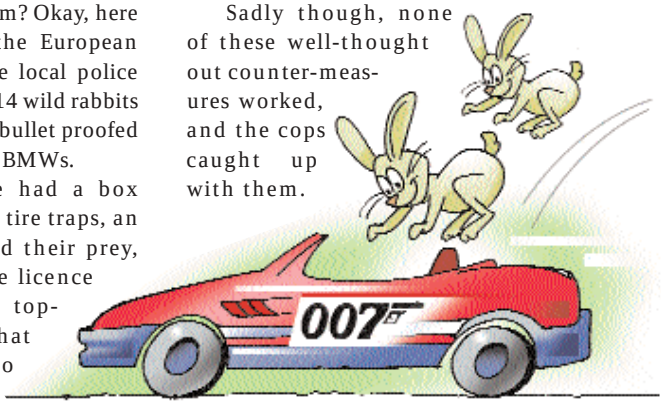
■ Penn State University, USA, links with Napster to offer students legitimate music downloads ■ IBM to hire 15,000 new employees… many outside the US

Not quite 007

Quick, what's common between James Bond and rabbit poachers in Belgium? Okay, here goes. Two rabbit poachers in the European nation were apprehended by the local police recently, after they whisked away 14 wild rabbits in, get a load of this, a steel-plated bullet proofed car *à la* Bond's Aston Martins and BMWs.

There's more. The vehicle had a box which could litter the road with tire traps, an external halogen lamp to blind their prey, and even lead shielding on the licence plates to avoid tracking. The top-rated gizmo was an ejector that could throw two bicycles fixed to the back of the car onto the road as an obstacle to deter pursuers.

Sadly though, none of these well-thought out counter-measures worked, and the cops caught up with them.



Net's dark sin

A UK-based children's charity has revealed that child pornography is on the rise. NCH reveals that in Britain, such cases have shown an 1,500 per cent increase since 1998. It identifies only one reason—the Internet.

NCH's report, '*Child Pornography, Child Abuse and the Internet*' pointed out that in 2002, 540 paedophiles were found in possession of pornographic material, or were warned by the police, as compared to 35 in 1998. It also exposed that offences committed in chat rooms have also risen dramatically. It has one more fear—the spread of 3G mobile services and phones, which they feel will allow users to transmit data and surf the Web without too much regulation or tracking.

snapshot

Web-ad spend to hit $6.9 billion in 2004

Source: TNS Media Intelligence/CMR

Domain-nating times

The World Intellectual Property Organization has ordered Alberta Hot Rods, a Canadian company to give up the domain ***www.jrrtolkien.com***, and return it to the estate that holds the intellectual property rights to all of the legendary author of *The Lord of the Rings* trilogy. The URL was linked to a commercial Web site ***www.celebrity1000.com***.

This could happen because the UN arbitration system allows people to claim a domain name if they think they have the right to own it, without paying large sums of money.

Though Tolkein died in 1973, his books are more famous now, especially after New Zealander Peter Jackson created the *The Lord of the Rings* trilogy on celluloid. Alberta Hot Rods has already lost cases from famous personalities such as Pamela Anderson, Celine Dion and Carmen Electra.

No messaging on Palm?

Used to chatting on your Palm? OK, time to start worrying. Instant Messenger support for the Palm OS is being cut, one-by-one. First, it was Yahoo! Messenger, which stopped working with Palm in 2002, and now ICQ doesn't work—they recently changed their network. All complaints to ICQ are being replied to with an irrelevant letter that says, "Since new wireless devices are constantly being released, each with their own unique technology, ICQ cannot test ICQ for Palm on each such wireless device." The only option left for Palm users is the AOL instant messenger—AIM for Palm. However, the current version is two years old and buggy. Further, it's not free—it costs $20 (approximately Rs 940). ICQ is developing is newer version, but it's still in the beta stage, and the site says that it's "a time limited free beta" version.

heroes

Linux user community

Standing united against the SCO's IP rights campaign, a group of companies, led by IBM and Intel, is now setting up a $10 million legal defence fund to help pay for possible litigation costs of corporate users of Linux.

Indian Consumers

With recent budget cuts, it's now cheaper than ever to buy computer hardware and electronics. Cell phones may be the cheapest in India—cheaper than Singapore—and complete PC prices will come down by 10 to 12 per cent.

zeroes

DDR2

Intel's pushing the Prescott processor family, and for DDR2 adoption. However, the limited number of suppliers, and the current price differential between DDR and DDR2, means that the chances of mainstream DDR2 adoption this year are slim.

Red Hat Linux 7.x and 8.0

Both these distributions have reached their errata maintenance end-of-life period. Users who expect support for these versions of Red Hat Linux will have little option, but upgrade to a newer release, or pick the Enterprise release.

■ Intel finally moves to provide closed-source Linux drivers for Centrino ■ Intel to drop Itanium prices—making Itanium servers more affordable

More than just browsers

Is the death of the browser imminent? We don't know yet, but a recent study by Neilsen//NetRatings, a market research company in the US, showed that 76 per cent of Americans use non-browser based applications such as media players, instant messengers and file-sharing applications to access the Internet.

The study showed that the total unique audience using non-browser applications reached 106 million during November 2003. The top applications online are Windows Media Player (34 per cent of the active user base), AOL Instant Messenger (20 per cent), Real Player (20 per cent), MSN Messenger (19 per cent), Yahoo! Messenger (12 per cent). The study also revealed that MSN.com was the most visited site during the same period.

snapshot

India has 42 million fixed telephone lines and 28.2 million mobile phones—over 70 million phone subscribers

Source: TRAI

Counterfeiting currency detector

The latest digital imaging version of the cat and mouse game involves the almost ubiquitous Adobe Photoshop, and our everyday paper currency. It all began with Photoshop's latest version Creativity Suite including a 'counterfeit deterrence system' that prevents users from accessing images of currency. When this system detects an attempt at accessing currency images, it aborts the operation by displaying a warning, and taking the user to ***www.rules-foruse.org***, a Web site that gives information on international counterfeiting laws. The description of Indian rules on this Web site is, "Under Construction".

But with users, it is sometimes just commonsense that lets them overcome the most difficult of problems, even if they are illegal. For instance, in this case, one can copy the image into some other program, and paste it in a new file in Photoshop. Another way is to open and save in an earlier version of Photoshop, and then open it with Photoshop CS. Yet another way is to invoke Photoshop from some other Adobe application, and scan currency images in pieces, and assemble them in Photoshop.

Adobe said they have been working with central banks for several years, and have just incorporated this piece of software developed by The Central Bank Counterfeit Deterrence Group. The code is so secret that even Adobe doesn't know it! Further, Adobe said that it hasn't made the system "bullet-proof" because that would affect the productivity of the users.

World's first in-flight WiFi connectivity

The mile-high club just got a whole new meaning—Emirates airlines will soon offer an in-flight wireless laptop service for e-mail and SMS. Called Tenzing Service after the company they collaborating with (Tenzing Communications of Seattle, USA), the service lets passengers connect to the service using their laptops, with little or no additional configuration.

This will be the world's first deployment of WiFi connectivity for laptops on regularly-scheduled commercial flights. The Airbus A340-500 will be the first aircraft with a wireless LAN for passengers. The service will be launched in the first quarter of 2004, on all of Emirates' new Airbus A340-500s.

Spam

Not the Real McCoy

Delhi High Court judge RC Chopra has ordered Indian firm McCoy InfoSystems to stop the transmission of unsolicited e-mail to any VSNL user. The judgement was in response to a case filed by Tata Sons Ltd, and Panatone Finwest Ltd, subsidiaries that own a large stake in VSNL. Since existing Indian laws do not offer legal recourse against spam, Tata Sons argued on the basis of trespassing and nuisance laws. In the end, a historic judgment was handed down, banning McCoy from using VSNL's resources.

Mobile wonders

The Financial Express reports that Indian advertising agency Ogilvy & Mather Interactive (O&M) is now looking at mobile phones as an avenue to help marketers build bonds, and using the phones as a customer response device. While this makes sense for solicited advertisements, it's also possible that fly-by-night operators may spam Indian cell phone users.

Join the fight

To counter the menace of spam, traditional (wired) ISPs and new-age wireless infrastructure providers have joined hands as the ISP Messaging Anti-abuse Working Group. The group—stalwart service providers such as Bell South, Bell Canada, Cox, Internet Initiative Japan and Openwave—have decided to jointly develop methods to shut down spammers before they flood networks. The group intends to set up a shared code of conduct and create best practices, to prevent spam, virii and other undesirables.

➜

■ SuSE and Red Hat Linux offer to indemnify customers against charges of copyright violations ■ Soon-to-be launched Nintendo DS will come with dual, side-by-side scree

Artists object to copy-protected CDs

Record labels are catering to digital music junkies more than ever before. And so, to prevent users from copying tracks to hard drives, they released copy-protected CDs, and instead supplied a copy of all the songs on secure digital formats such as Windows Media, which can then be transferred to hard drives and portable music players. While the record labels are satisfied with this approach, there's a slight problem of royalties. Song writers and music publishers, who get paid for every copy of the song sold, contend that since these unique double-format discs hold two copies of the song, they should be paid for both. While this is an issue that has been argued over for months, the problem has become rather acute as hundreds of millions of such copy-protected CDs have been sold. This raises the spectre of huge back payments. With music publishers and artistes getting as little as 7 to 8 cents (US) for every copy of the song sold, and record labels trying to push for greater profits—in a market that they claim is depressed because of file swapping—here's yet another stumbling block to copy-protected CDs.

snapshot

NASA's **Mars Rover** sites witnessed data transfers of **34.6 TB**, and had over **260 million** hits per day

Source: NASA/eTouch

British song-swappers may now be sued

The British Phonographic Industry (BPI) may now begin doing in Britain what the RIAA and similar groups have been doing in America. In a recent announcement, the BPI said that it 'may' sue people who swap songs over the Internet. Andrew Yeates, director-general, BPI, said that the organization was hoping to encourage new, legitimate services such as iTunes. Such services are expected to be launched in Europe later this year.

In the US, the cases that the RIAA had initiated against song-swappers generated bad publicity, after it turned out that amongst those targeted, were a 12-year-old girl and a 66-year-old grandmother. Surprisingly, the decision to sue song-swappers in the UK came just after CD sales in the UK hit a record high of 121 million units in 2003.

Regarding the steps the BPI was taking, a spokesman said that they were holding talks with ISPs across Europe, with the intention of streamlining a process that would identify Netizens distributing the most songs.

tomorrow's technology

Ultrasonic at heart

Current medical ultrasonic equipment is bulky, but this could change if crucial parts of the machine were placed inside the human body. Butrus T Khuri-Yakub, a scientist at Stanford University, has developed a prototype of a miniature ultrasonic device. He is working on developing a 3D medical imaging system that will fit on a catheter, which can be fitted inside arteries. The technology is called capacitive micro-machined ultrasonic transducer. Currently, piezoelectrics are used in ultrasonic equipment, but new transducers utilise silicon manufacturing techniques, and can be shaped and integrated with electronics.

Tiny drum-like transducers made from silicon, and a membrane of Silicon nitride is put on the drumheads. An electrical signal, applied between the membrane and the silicon substrate, generates an electric field, causing the drumheads to vibrate and emit ultrasonic waves. The waves are converted into acoustic beams that hit tumours and artery walls. The drumheads pick up the reflected beams, and produce electrical signals, which are used to construct images.

quoteworthy

"Software is not becoming free, but it is becoming a commodity…. Open source is good for general software such as the kernel and development tools, and commercial software is good for specialist software."

Linux pioneer, Linus Torvalds in an interview with *Computerworld*. Torvalds works full time on Linux kernel development with the Open Source Development Lab, a consortium supported by corporates to further developments in Linux.

"For me, I'm looking for a situation where I have a lot of freedom around the development of our products, and the way those products come to market."

Ed Fries, formerly head of Microsoft Games. He leaves Microsoft after having worked with them for 18 years.

"There are acupuncture points in integrated systems like power supply systems, railway signalling systems... any attack on these points would disable many services."

Arun Shourie, Minister for IT and Communications, announcing the setting up of the Indian Computer Emergency Response Team (CERT-IN) to tackle hacking and virus attack. ***(http://www.cert-in.org.in/)***

■ Yahoo! to drop Google as search partner; intends to use Inktomi; sets up Yahoo! Research Labs ■ AOL ties up with MovieLink; offers movie downloads at 99 cents ea

Oye Balle Balle

Yaar tusi log andaja nahi laga sakde thade magazine *to menu ki kuch milya aaa.* By God, *meinu harani is gal di aaa ki meri nazar* Digit *te pehla kyon nahi pai.* You see I visit bookshops regularly, and buy all sorts of current affairs magazines. PC *laye nu doh ka saal ho gaye aa, main oo* different magazines *ek hor bhi aa patani nu check kar ke hi chad dita.* You see all that boring classroom kind of articles to explain technology is no fun. Not interesting at all.

By chance *pichle mahine ek* library *ch* Digit *dekhi. Mera apni copy kharedan da mood nahi se, lekin jisla main sari* magazine December issue *pad lai menu pata lag gaya ki* December issue *tan kharedna hi pena aaa. Yaar tusi haal di ghadi meri* software *quest te* hardware lingo *nu ek* direction *de ti aaa. Tabahi macha ti aa thadi* magazine *ne. Agle mahine main* Melbourne *ja reha yan,* Masters *karan. Nazar rakhoonga* computer magazines *te utthe. Dekhda aan phe tusi kithe stand karden aaan... Changa phir.*

ILLUSTRATIONS: Mahesh Benkar

Amardeep Singh
Via e-mail

digit

Sat Sri Akaal Amardeep Bhraaji,
Tuaade comments *layee baut baut* thank you. *Asi te har wele ayi koshish karde ne ke saade* readers *waaste changa* content magazine *wich* cover *karein. Tusi saanu apna* feedback *dende raho, saanu* magazine improve *karne kayi baut kaam aande ne.*
Changa phir

Santa's gift

The December 2003 issue was one of the finest I have ever read. The software selection was pretty good, and I must say I enjoyed the movie very much. The Technology Encyclopedia will surely help me for getting my basics right about what the computers are made of. The best part was the Zero1 awards coverage. It helped me convince my parents to buy the correct hardware. Hope such exciting issues keep coming the readers' way.

Nitin Gajjar
Via e-mail

digit

Hey Nitin,
The December issue was the most back-breaking of them all for everyone of us at Team Digit—the writers, the sales team, the logistics team, the distribution team. But surely, it was worth it, considering the letters we have received.

Techno babble

Digit keeps me informed about the latest technologies. But you know, sometimes I cannot understand some terms regarding hardware and software. Can you please include one or two pages on tutorials for kids, so young readers like me can understand the techno world better?

Gaurav Dadhania
Via e-mail

digit

Hey Gaurav,
We are one magazine parents never snatch from their kids! Actually, we try to keep our language as simple as possible, so even a newcomer to technology does not feel intimidated. But your suggestion is a good one, and we shall definitely make reading our stories even easier in the coming months!

Queen of hearts

I was surprised to see actress Rani Mukherjee's photo on the cover of the December 2003 issue. I did not know you featured actresses. Next time, please put Aishwarya Rai on the cover.

Devendra Panchal
Via e-mail

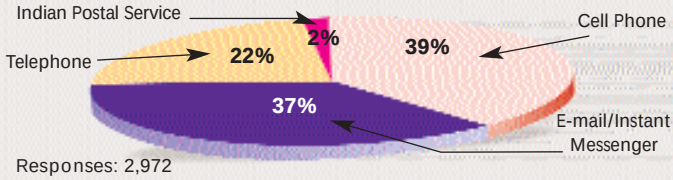
digit

Dear Devendra,
We must confess that your suggestion did perk up a few tired souls in our office. However, if we put Aishwarya on the cover, we will have our female readers hollering at us, asking for Hrithik Roshan on the cover. Then you will ask for Preity Zinta, after which they will ask for Aamir Khan, and the war of the sexes shall continue. In the interest of preserving humankind, we have decided not to put Aishwarya on the cover, at least in the near future. But you never know. One day, we may have both Ash and Hrithik on the cover, and we could still prevent that war. Until then, hang on.

digit READER POLLS

Your vote counts

Q. Which is the means of communication you use the most?



Responses: 2,972

This month's question:

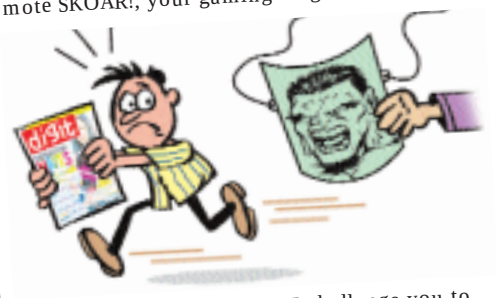
Would you buy a high-end graphics card?

☐ Yes
☐ No
☐ Only if the prices dropped
☐ I already own one!

*Log on to **www.thinkdigit.com** and vote*

More games

Thanks for a great review of various laptops in the January issue. I finally decided to buy one. I have one complaint, though. I loved Digit for its gaming articles, but now you have stopped them to promote SKOAR!, your gaming magazine. But remember we live in a democracy. I challenge you to take a readers' poll on whether Digit should carry more articles on gaming or not, and I am sure we gamers will win hands down. Hope you look into my demands.



Vaibhav Kumar Dubey
Via e-mail

Dear Vaibhav,
Who are we to play games with our readers' wishes? If you go through this issue, we have a three-page interview with David 'Daz' King, a leading gaming artist from Australia, who reveals every secret behind what goes on in the making of a game (Pages 24-26). Did we stop at that? No, we put in two full pages devoted to gaming in the Arcade section of the magazine (Pages 158-159). In short, we are game to meet every demand of our readers!

Ticket to Planet Digit

I am interested in knowing more about the Planet Digit programme. I would like to attend—either at Chennai or Bangalore. Could you tell me the entry criteria?

Cyrus Bhagianath
Via e-mail

Hi Cyrus,
Ok, let's keep this as easy for everyone as possible: The only criterion for attending Planet Digit is a passion for technology. Since you are a technologist at heart, entry should be a breeze. Here are the details of the where Planet Digit will take place in the country:
Mumbai: Nehru Centre, Worli
31 January - 1 February, 2004
Bangalore: Koramangala, 7 -8 February, 2004
Chennai: TNTPO, 14-15 February, 2004
Delhi: Indira Gandhi Indoor Stadium,
28-29 February, 2004
Kolkata: Netaji Indoor Stadium, 6-7 March, 2004
Want more dope? Visit ***www.thinkdigit.com/planetdigit***, where you will be able to download the Entry Pass free of cost. Take a printout, and we'll see you there!

Education, not reviews

Why don't you include some educative topics such as Flash Designing and Web-designing in the magazine? This will be of more use to readers than reviews of laptops.

Appu R
Via e-mail

Hey Appu,
Business executives will frown at your suggestion that web designing articles will be more useful than laptop reviews. Nevetheless, we keep printing articles on Web-designing and Flash animation quite often. You should keep a lookout for them.

From the Forum (*www.thinkdigit.com/forum*)

deXter
In-house geek
Joined: 24 Dec 2003
Posts: 102
Location: Mumbai

Posted: Thu Jan 21, 2004 8:45 pm **Subject:** Cooling systems

I wanted to cool my cpu, but I didnt have big bucks, so I had to make do with the resources available. And I decided on water cooling! I had an abudancy of plastic bags, so using tape and scissors, I made a small pouch the size of my cpu, with an inlet and an outlet. These were connected to plastic tubes, which I had made from the same covers. So I put the pouch on the cpu, filled the inlet with water, did some modifications and I had my own water cooling system! But ofcourse, the whole thing started to leak. After a couple of days, I opened up my cpu to find WATER on the surface!! Luckily my PIII was cartridge-slot-based —so the flat surface prevented any water from dripping into the circuit. I immediately switched off my cpu, and again, nothing happened. And to this date, I still use that old CPU, albeit at a faster speed.

TheMASK
Digitized
Joined: 24 Nov 2003
Posts: 818
Location: Mysore

Posted: Sat Jan 17, 2004 1:56 pm

Dexter!!! U live up to ur nick, don't u?? ;)

Goof Ups

- Abhishek Aggarwal has pointed out that the information given, for *Halo* in the Arcade section, was incorrect.
- In the January issue, under the leaflet of the cover, we printed that the one-year subscription contained 24 issues. Thank you Sudhanshu, Rajiv and Atul for pointing it out.

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

E-mail: readersletters@jasubhai.com
Send your letters marked 'Readers Letters' to the Digit office:
D-222/2, Om Sagar Building, MIDC, TTC Industrial Estate, Nerul, Navi Mumbai 400 706
Phone: 022-27629191/9200 Fax: 022-27629224

All in The Name of The Game

David King,
Game Developer Consultant,
Discreet

> "I'd like to work at the speed of thought—you think of something and do it"

As a child, the England-born David King would often draw monsters in his art book, even as other youngsters would play soccer and cricket. His father, not exactly impressed with his choice of subject to show off his art, often admonished him.

Today, Daz, as the 27-year-old is known in gaming circles, makes more money in a year drawing monsters than his father spent on buying his first house. Of course, he never tires of pointing that out to him.

In his own words, Daz is a professional digital artist, consultant and 3DSMAX lecturer in Sydney, Australia. He is an artist of repute, not to mention a cinema freak and student, a quality he uses to the fullest while developing art assets for some of the world's top gaming titles.

Daz was in India recently, speaking on what goes into the making of a game. At the end of an offbeat, interactive lecture, Daz spent some time with Digit.

■ For many, developing games would seem similar to making an animated film. How close are they really to each other?
The processes are similar, but technically, there's a lot of difference. In gaming, scenes are rendered 60 times a second, while with movies, you can actually take days to do a render. So, it's a completely different scale. Solutions that work in games don't work in films, and vice versa.

■ nVidia's concept of "cinematic computing" is being talked about a lot? Are you excited about it?
Yeah, sure! I mean, real-time feedback makes an artist's life easy. What this means to the gamer is that, the next-generation games will be fast and fluid.

■ But cinematic computing's still a long way off, right?
Well, let me put it this way. Just about a year ago, if you'd told me about real-time bump-mapping in *DOOM III*, I'd have laughed at you. Advances in hardware are spiking; they're exponential. And so artists have to struggle to keep up with this. It's interesting to see the FX demos. They've just blown me away; they're incredible. But you won't see games go that way for a long time, simply because the cost of making assets that detailed and that complex is enormous. You've got to paint high-resolution textures for all those characters, then the polygons, the subtlety and nuances in the face have to be just right. All this costs a fortune. (*What is cinematic computing? See box 'Cinematic Computing' on Pg 26*)

■ So how long do you think it'll take?
Don't think I can say. If I can draw a line from the time I started learning MAX until now, I'd say less than two years. I'd say they've got stuff running right now that's really impressive. Nothing very soon, but I don't think it'll take too long.

■ Why are monsters your favourite subject for your kind of art?
Monsters are great from an artistic standpoint; they're a manifestation of human fantasies and fears. A dragon is everything we fear—sharp teeth, fire, anger, rage, claws. H R Giger's *Alien* (Giger created the Alien in the eponymous Sigourney Weaver movie) carries great metaphors as well. With monsters, you're creating a human inside out, so there's great flexibility and interpretation.

■ Animated movies are growing in popularity. Will they ever replace conventional films?
Why would you want to do that? I think you'd miss the humanity in the acting performances. Anyway, I guess the one thing that stops virtual actors from becoming a reality is that you require more actors and more people to get a virtual actor to work. But technology is making creation of digital assets very simple. Sony ImageWorks, I think it was, was talking about a test they did where they had a young Harrison Ford's digital model acting beside the current Harrison Ford. It was like he meets himself as a young man. Apparently, it was just breathtakingly done. That would be an exciting reason to do it. But not replace real actors all together. The reason why Gollum (an animated character in *The Lord of the Rings* [LOTR] trilogy) looks so good is because the animation is done over ac0not like a virtual actor at all. Gollum is just like a digital rubber suit over an actor. But it's a really good one. So I think that's the way to go. We're already seeing that. I mean, Gollum's just so fabulous!

■ Which reminds me, what is your best work?
A lot of my best work never gets seen. I do a lot of pitch proposals for games. I was working on *Middle Earth Online* (a Massively Multiplayer Online Role-Playing Game [MMORPG] based on the LOTR

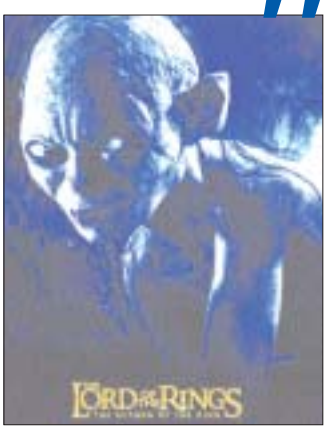
Dawn, the computer-generated fairy, showcases what nVidia's graphics engines can create—in real-time

franchise) for a while, which then moved on to another company. This game's been through five or six companies, so it looks like if a company touches it, it's in trouble. It contains awesome work, my favourite. But since I don't have the rights to show you that—the project's gone to someone else—you'll never see it!

■ Is this the case for most artists—their best work is not always published?

No, often I think they're lucky. There's an artist we've got in Sydney. He's working on a company project that hasn't been unveiled yet. But he works in his spare time on his folio, and some of the stuff in there far surpasses the work actually in the game. But this isn't always the case. Take Gollum for example. Oh boy, are they showing their best work! If you've got better work than Gollum, I'm just gonna kill myself! (laughs)

> "It's funny, because you make a lot of Indian movies, more than Hollywood, with Indian characters and content. and yet, in the games industry, you only play Westerners"



Gollum represents a leap forward in animation

■ What is it like behind the scenes? Where does the artist's work begin?

The first interaction is with the game designer. Here you create a concept, and the feedback is given immediately. You can smoothen the whole process, which makes for a much better product. So the artist's job really starts by opening up a good conduit to the designer.

The Alien is an icon of the horror sci-fi genre

■ How have the tools you used evolved over the years?

The best thing about new tools is not the features, but the ease. Ever since there's been competition between 3D software packages, you've seen better interfaces, and I can only hope this just keeps going. Essentially, I'd like to work at the speed of thought—you think of something and do it. Right now, you have to sit and work out mechanically what you have to do. If you want to make a nose, make a nose; and we're seeing that with interfaces now. They've evolved hugely. What I would love to see in the next generation of 3D tools is for them go over the old features, and make them smooth, silky and easy to use.

■ What do you think game artists need to learn to make it big?

The keyword is art. As artists, you need to be able to "look" correctly, and see. Life Study drawing classes are vital, because they teach you how to look at the world around you in terms of shape, form, light, shadow, mass, muscle, structure, anatomy, proportion... I could go on and on. The actual fundamentals of the art—that's where you should begin. In the Indian market, because they don't have a lot of experience in engines and tools, the way they can get over that is by studying the art, the actual principles behind it all. Check out books like *Illusion of Life*, which are the Walt Disney books, and spend time on the Net and really look at what people are doing out there.

■ Internationally, how many Indian artists or animators have you come across who're in the same field as yours?

I have one animator who's Indian. He's actually a naturalised Australian, but his parents are Indian. I haven't actually counted that many in Australia.

■ How difficult will it be for Indian talent to make it big internationally?

Well, the trick is to make games that are interesting and fun to play, games that are polished and have something that's just slightly different about them. We're very sick of playing drab, grey Gothic horror games, World War II games, and so on. Seeing new genres is hard today, but seeing new times and places and fantasies and mythologies—Indian mythology, for example—would evoke great interest. The West has embraced Japanese and Korean games, so it's entirely possible that Indian games go the same way.

■ It's interesting you said that, because Paradox Entertainment, which is developing *BattleDust: The Championship*, says that it included international characters to appeal to the foreign market. Are you saying that

Middle Earth Online is a highly anticipated MMORPG

Cinematic Computing

Typically, a feature-length animated 3D film takes over three years to complete. Most of this time is taken up by the rendering process. Every second of animation is composed of 24 frames, or still images, which, when displayed rapidly, produce the illusion of motion. Therefore, in a two-hour movie, for example, you'd have 7,200 seconds, or 7200 x 24 = 1,72,800 frames.

It takes around 8 hours for a high-end machine to render each highly-detailed individual frame. Therefore, another multiplication reveals that the time required to render the whole movie will be 1,72,800 x 8 = 1,382,400 hours, or roughly 158 years to make one movie. Since this far exceeds the average life expectancy, studios use thousands of computers—called rendering farms—simultaneously to get the movie to theatres in an acceptable timeframe. This is where cinematic computing comes in. While playing computer games, the PC needs to render 24 frames every second, in real-time. To achieve this speed, it has to make huge compromises in quality, making what you see on the computer screen, far removed from what you see on the movie screen.

However, with advances in technology, we get more and more powerful graphic processors. With this equipment, game developers are now in a position to increase the quality of the video card's output, gradually reaching the level of an animated movie. This concept of creating ultra-high quality graphics in very rapid times is called Cinematic Computing.

> "It becomes a staring contest, where you become almost Zen-like, and then suddenly 'paba-paba-paba', and you're dead"

it would be better had they used Indian mythological characters instead?

You know what's a scary thing? I don't think Indians would buy games with Indian stars! It's funny, because you make a lot of Indian movies, more than Hollywood, with Indian characters and content. And yet, in the games industry, you only play Westerners. It's weird! (laughs) So I think that if the same sensibilities that Indian movies have were taken to games as well, it'd be a good thing.

■ **Any Indian entities you've come across that hold great promise?**

Everyone I met so far has shown great promise. You've got so many new faces that are really willing to learn. It's that spark that sets a game company apart from one that's just doing its job and plodding along, churning out boring games. So if you project that with the absorption of new skills, you're going to see some pretty awesome work.

Already, a lot of the world's coding work is done in India. If you show the game industries in America, England and even Korea or China what you can do, you'll see a lot more outsourcing companies springing up.

■ **So what are the distinct skills of Indian game companies?**

I was really happy to see that in *BattleDust*, they spent so much time on the Indian temple level, and it shows. If you look at the other levels in comparison, it really shows. I think India doesn't have a style to speak of yet. Japan has a style, Australia has one, and America has one or two styles. You can look at a Japanese game and recognise it instantly. I imagine we'll eventually see one for India.

■ **Which is your favourite game? Any genre you prefer?**

I like thinking man's first person shooters. So *Counter-Strike* for me is the most well-balanced game I've ever played. I loved *Dead or Alive 2*. When you play with another *DOA2* player, it's like playing chess, because you make one mistake, and your opponent's going to trash you. So eventually it becomes a staring contest, where you become almost Zen-like, and then suddenly 'paba-paba-paba', and you're dead. *DOA3* kind of like threw a spanner in the works there, but I love that series a lot. I played *Deus Ex* for about 20 minutes, but couldn't find the time to play it more. My favourite game of all time at the moment is *Buffy the Vampire Slayer* for the Xbox. The reason is, I'm a *Buffy* fan, and I thought that anything that even tried to work on *Buffy* would be terrible. And yet the game was so good. I haven't played the sequel, but I'm waiting for that.

One game I'm really itching for now is *DOOM III*. *Half-Life 2* looks great, but I'm interested in seeing what Id's going to do. It's just got so much atmosphere and mood to it. I want to shoot a zombie down the stairs. I'm dying to do that. I've been very good—I haven't touched the alpha version that leaked out. I'm waiting for them to finish the game, and buy the full version.

■ **What do you think of the mobile game market?**

Mobiles are a great place to start. All you need is one Java programmer, one pixel-pusher. I'll tell you what, I saw some of these Korean mobile phones, and brace yourself guys, there's some great shit coming your way. It's like full 3D phones. Not sprites, 3D is very rudimentary, but it's there. So I'm sure you'll be playing *Quake I* on these things soon. Wow! (laughs) So brace yourselves, because there's some pretty crazy things those Koreans are cooking up right now. All I want is a mobile phone that opens like Neo's!

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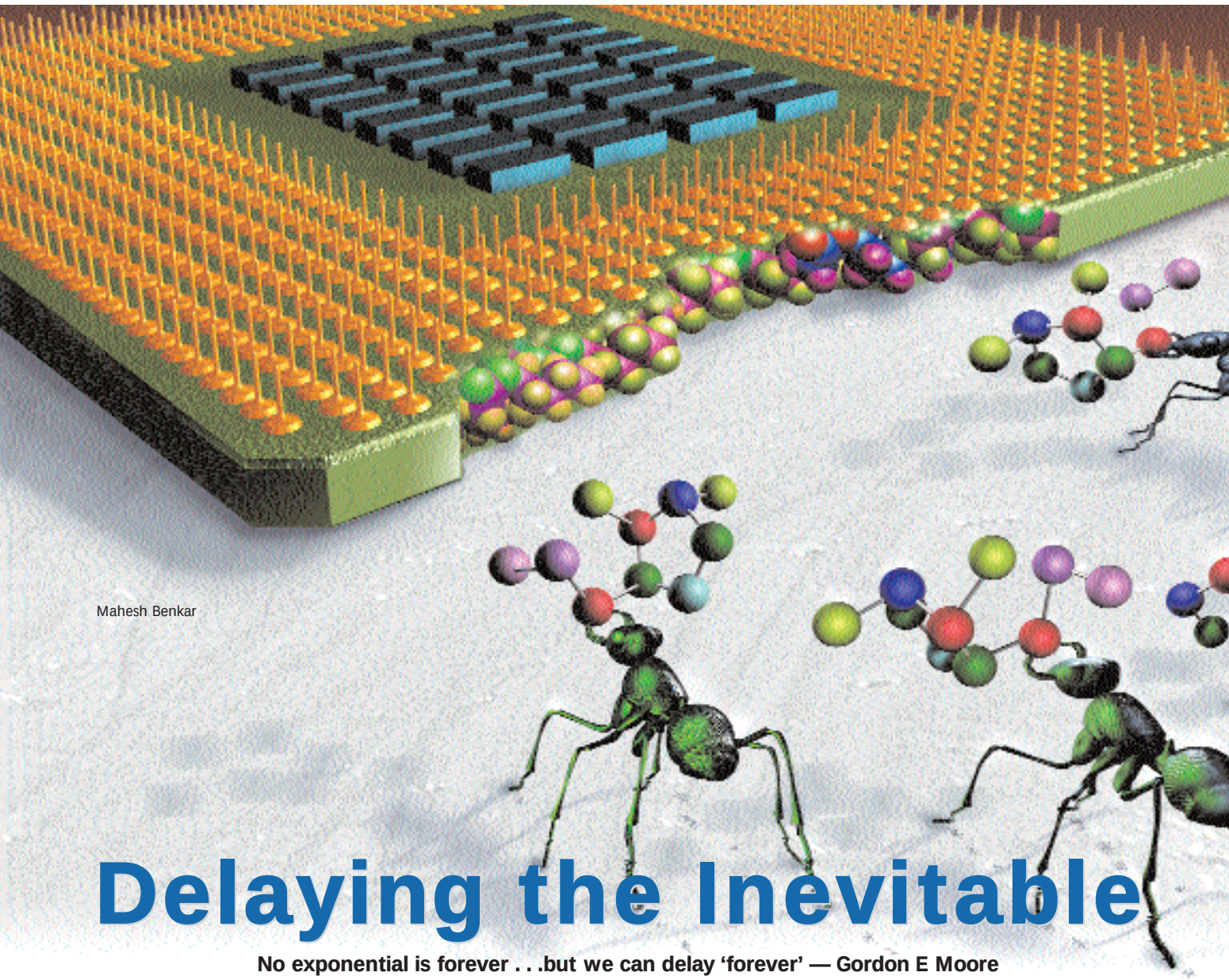


Mahesh Benkar

Delaying the Inevitable

No exponential is forever . . .but we can delay 'forever' — Gordon E Moore

If necessity is the mother of invention, then the necessity for the semiconductor industry to keep inventing is Moore's Law. In an article published in *Electronics*, in 1965, Intel co-founder, Gordon Moore, predicted the rate at which the number of components on a single chip would double every two years. To understand the effect of Moore's law, consider this—Intel's first processor 4004, contained 2,300 transistors, while the current generation Itanium2 contains 410 million transistors.

So, what's the problem? This shrinking of chips cannot go on forever. Gordon Moore is optimistic that, at least for a decade, his law is safe. The general perception is that this law can't be extended after 2015 to 2020. The big question is, how long can we sustain it?

Chips are manufactured using a process known as lithography. The basic ingredient of integrated circuits is silicon in its purest form. This is obtained from its ore using a chemical process. It is then shaped into circular discs called silicon wafers, the diameters of which vary depending on the manufacturing plant. The chips are then manufactured on these wafers using lithography. Layers built on top of the silicon wafer form the transistors, and connections between them are etched using a powerful light beam. Multiple transistors when connected together form a chip. Many chips can be fabricated on a single silicon wafer. The percentage of chips produced without faults is indicated by the term 'yield'.

Adding transistors enables the chip to provide extra features such as a larger instruction set. As the transistors get smaller, the connections need to get thinner. Chips have already shrunk so much that some connections between the transistors are just a few atoms wide. Components in a chip are measured in nanometres—a billionth of a metre. Manufacturing them at such a scale is no easy task; IBM describes this process as filling a golf hole from a flying aircraft! One of the major stumbling blocks is the huge amount of heat generated when transistors are so closely packed. Witness the huge heat sink and fan combination that dissipate heat emitted by processors. Further, at atomic scales, it becomes difficult

What's What?

Problem: Chip manufacturers are finding it difficult to extend Moore's Law. Power dissipation, current leakage and manufacturing costs are preventing them from moving forward.

Solution: Developments such as high-k/metal, self-assembly, carbon nanotubes, strained silicon and new lithography techniques promise to keep the torch lighted.

Bottom line: Moore's Law will be valid at least for another 10 years. It may slow down after that.

to control the flow of current within the chips. An unwanted flow of current is called current leakage. This makes the transistors move from a pure On or Off state, to a fuzzy state. Another problem is manufacturing costs. Companies have to keep decreasing the cost per transistor so that they can offer better processors at the same, or marginally higher cost.

Scientists are looking at various methods to extend Moore's law—some are evolutionary, few revolutionary. All these can be classified into the following groups: looking for alternate materials other than silicon; using light instead of electricity to transfer data within the chip; shrinking the existing technology; completely different fabrication methods that involve polymers; looking at other forms of computing such as quantum computing, DNA computing. Let's look at some notable efforts.

High-k metal

Transistors act like On/Off switches. The gate (gate electrode), is a part of the transistor that dictates whether the transistor is in the On or Off state. Below the gate, is the gate dielectric that acts like an insulator, preventing the flow of electricity. For the past 30 years, silicon dioxide has been used as the gate dielectric. However, reducing the thickness of the silicon dioxide gate dielectric results in higher current leakage. Hence, researchers are on the lookout for alternate materials with better insulating properties. Intel has developed a new class of materials, called High-k to replace silicon dioxide as the gate dielectric. High-k stands for 'high dielectric constant' and is a measure of how much charge a material can hold. Air is used as the reference point for this constant, i.e. air has a 'k' of 1.0, and similarly silicon dioxide has a 'k' of 3.9. Intel has discovered materials such as hafnium dioxide (HfO_2), zirconium dioxide (ZrO_2) and titanium dioxide (TiO_2) that have higher dielectric constants than silicon dioxide. However, the newly discovered high-k materials won't work with the existing gate electrodes that're made of polysilicon. So, Intel developed the right type of gate electrode for the new high-k gate dielectric. The new gate electrode will be made of metal.

Sunlin Chou
Senior Vice President, Intel

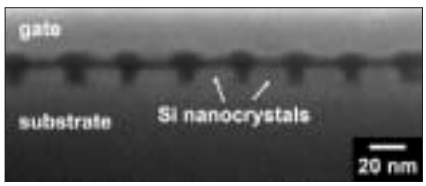
"Intel will use High-k along with other innovations, such as strained silicon and tri-gate transistors, to extend transistor scaling and Moore's Law"

When a material with high 'k' value is used as a gate dielectric, it results in transistors with higher capacitance. It's very easy to distinguish between the On and Off state when a transistor has high capacitance. This also results in faster transistors. Also, high-k materials reduce gate leakages a 100 times, which translates to chips running at much lower temperatures. Thus, the high-k/metal gate technology removes the major block towards the continuing of Moore's law. Intel made this announcement in November 2003, after five years of research. It claims that the process is on track for production in 2007.

Self-assembly

In December 2003, two IBM researchers, Chuck Black and Kathryn Guarini, announced that they have built a Flash memory device using self-assembly techniques. Self-assembly is a subset of nanotechnology that refers to the ability of certain objects to autonomously arrange themselves into patterns.

The most important feature about the IBM development is that it's compatible with the existing manufacturing tools, thus obviating the need for expensive tooling changes. "As components in information technology products continue to shrink toward the molecular scale, self-assembly techniques could be used to enhance lithographic methods," said Dr T C Chen, Vice President of science and technology at IBM Research.



Magnified image of the FLASH memory device created by IBM using self assembly

Currently, photolithography is used to etch connections on the silicon wafer with a combination of light and a mask—akin to a stencil. However, at atomic scales, it is not possible to form precise structures with this process. IBM researchers used polymer molecules that organise themselves autonomously into precise hexagonal patterns. These patterns have small holes with a diameter of 20 nanometres (nm) and the holes are separated by 40 nm. This is used as a stencil to reproduce a similar pattern in silicon dioxide, after which the polymer is removed and is no longer needed. Now,

But is Moore's Law Relevant, Anymore?

Moore's Law has put the chip manufacturers on an aggressive road map. Applications aren't demanding powerful processors anymore; it seems to be the other way round. Companies are foreseeing applications for the processors that are yet to be released. Over the years, while the transistors in a chip seem to be increasing exponentially, the end-user experience doesn't seem to be reflecting that trend. Without a doubt, there is a need for more powerful processors and companies do have to keep developing them, but we have reached a stage where there is no need for such high acceleration to move forward. "There is very little in terms of mainstream software that is coming out anytime soon that needs more performance on the desktop," said Mark Margevicius, Research Director at Gartner Inc. While many wouldn't agree with him, they would agree that there is a sizeable population using their PC only for light work such as word processing, browsing, etc. Is anything being made to improve their experience?

Using multiple processors instead of one powerful processor is another direction to go. Google, for example, has one of the largest processor farms. When the 130W consuming Itanium was released, Google refused to buy any of it, citing its power consumption. Many of the systems used by Google are Celeron-based. Maybe it's time to have a second look at Moore's Law, maybe not!

the silicon material is deposited and etched to form nanocrystals measuring 20 nm. Finally, the gate is formed over the crystal array. Data storage is done by injecting and expelling charge into the silicon nanocrystals. Thus, each nanocrystal can be used to store a single bit of data.

The entire process was done on a 200 mm silicon wafer using methods that employed existing chip fabrication tools. "In effect, we have combined self-assembly with semiconductor fabrication," said Black. Further reduction in the size of the nanocrystals is possible by using polymers with lower molecular weight. Talking about its advantages, Guarini said that since there are so many nanocrystals, even if one loses the charge, the device won't be affected much. That's because, "There are so many more nanocrystals keeping the charge, thus allowing the flash cell to keep working."

Dr. Phaedon Avouris

Manager, Nanometer Scale Science, IBM Research Centre

"The basic science is still not totally understood. Nature does use self-assembly, but nature had a research and development time of over two billion years"

Strained silicon

Originally, work on this technique was done by Judy Hoyt, a physicist at the Massachusetts Institute of Technology. The speed of the flow of current in a chip depends on the structure of the silicon lattice. Each silicon atom has an energy state around it called an orbital. These orbitals merge to allow the current to flow through the silicon lattice. There are six orbitals around a silicon atom; two are in the direction of the current flow while four are perpendicular to it. In normal circumstances, all the orbitals have equal energy so there is no preferred direction when current flows. However, when the lattice is stretched, energy in the two horizontal orbitals decreases, which allows the electrons to flow faster in that direction. Similarly, squeezing the lattice allows positive charges (holes) to flow faster through it.

There are two types of silicon regions in a transistor: n-type and p-type. Silicon, when doped with elements such as phosphorous, acquires extra electrons—this is the n-type silicon. Similarly, silicon doped with elements such as boron acquires a 'hole', which is an electron deficiency—this is the p-type silicon. Therefore, to increase current flow, the n-type areas have to be stretched and the p-type areas have to be compressed. Depositing silicon nitride over the transistor at high temperatures stretches the silicon lattice. While cooling silicon nitride, it forces the silicon lattice below it to spread out; this stretching helps to speed up the electrons flow by 10 per cent. The p-type region is compressed by carving trenches along its opposite ends and filling them with silicon germanium. As a result, the hole conduction improves by 25 per cent.

The flow of either electrons or holes is called current flow. So, the faster the flow of current, the quicker is the switching of the transistors between the On/Off states, which results in faster processors. All this is achieved without having to reduce the size of the transistors. Implementing the strained silicon technique results in an increase in manufacturing costs by just two per cent. Intel has successfully implemented this technique and will use strained silicon in its upcoming processor—Prescott—that will have components measuring 90 nm.

Carbon nanotubes

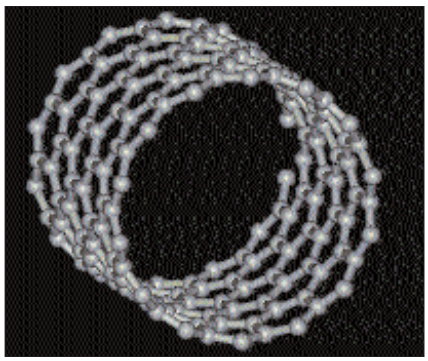
Carbon nanotubes are extremely thin and very long cylinders of carbon atoms. The typical radius of a carbon nanotube is around a few nanometers; at the same time, their length can be thousand times that of the diameter. Compare this to the components in the Intel Prescott and you get a clear, defined picture of what it is. This nanostructure was discovered by Sumio Iijima, an NEC researcher in the year 1991. Ever since its discovery, there has been a lot of interest in them and a lot of R&D has been going on around this material. This is because carbon nanotubes have an interesting structure that allows them to have some extraordinary properties—they are extremely thin, but stronger than steel. They have potential applications in not just electronics, but in fields ranging from automobiles to constructions. Samsung has developed display prototypes using carbon nanotubes. Indeed, these nanotubes look like 'one-size-fits-all-solution'.

Pure carbon is found as graphite and diamond. Owing to its atomic structure, diamond is the strongest material. Graphite's layered structure causes it to have both metallic and non-metallic properties, making it more of a semiconductor. The layers, formed by carbon atoms bonded in a hexagonal pattern, are loosely stacked over one another, analogous to a ream of paper. Carbon nanotubes look similar to a sheet of graphite rolled into a cylinder. Due to these structural similarities, carbon nanotubes share the semiconductor properties of graphite.

Like diamond, the bonding of atoms in a carbon nanotube is very strong; thus giving it very good stability. Carbon nanotubes don't suffer from current leakages and thermal problems that besiege the current silicon-based processors. There are two types of nanotubes: Single Wall Nanotube (SWNT) and Multi Wall Nanotube (MWNT). SWNT are structured like normal cylinders, while MWNT have a structure similar to concentric cylinders enclosed within one another. Of these, the former is suitable for usage in the semiconductor industry.

Depending on their molecular structure, carbon nanotubes can be made to act as a metal, insulator or a semiconductor. They should be manufactured in huge quantities with the desired molecular structure. Many techniques have been developed for manufacturing carbon nanotubes, but these are still confined to research labs. Nevertheless, a lot of progress is being made towards making this an affordable alternative to the current technology.

A lot of companies are working on carbon nanotubes: in May 2002, IBM researchers announced that they have created transistors based on carbon nanotubes that perform better than silicon transistors. Nantero, a Massachusetts-based start-up company is developing a nanotubes-based memory. The Nantero technique involves embedding horizontal strands of carbon nanotubes into silicon. Perpendicular to this, vertical strands are suspended. When a suspended carbon nanotube doesn't touch the one at the bottom, electrical resistance is high, which is interpreted as 'zero'. However, when a small electrical charge is applied,



An illustration showing the atomic structure of a carbon nanotube

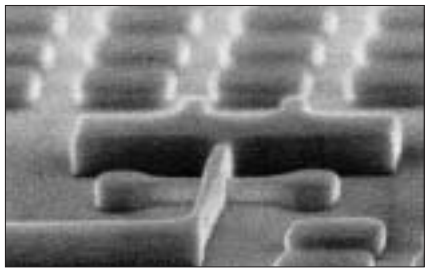
the two come in contact and resistance is lowered. This is considered as 'one'. Thus, ones and zeros are stored in the memory. These miniscule nanotubes provide for a lot of storage space within a small device. The company is hoping to bring out a working prototype by early 2005. Intel is also researching carbon nanotubes.

Three-dimensional transistors

Tri-gate transistors are non-planar and have a 3D structure. The current transistors have a planar structure—the current flows on a single plane. However, a tri-gate transistor is like a building in which current flows vertically as well as horizontally. Speaking about the limitations of the planar design, Dr. Gerald Marcyk, director of the Components Research Lab, Intel, says, "Our research shows that below 30 nanometers, the basic physics of the flat, single-gate planar transistor leaks too much power to meet our future performance goals".

In a tri-gate transistor, current flows on the top surface and also on the vertical walls. This gives more space for current flow, which, in turn, results in lower current leakage. Thus, chips based on tri-gate transistors can be made to run faster than planar chips by about twenty per cent. In 2001, Intel introduced a new class of transistors called TeraHertz transistors. These can switch between the binary states at a speed of 1000 GHz. The TeraHertz transistor is the result of three developments, namely, high-k/metal gate, tri-gate and finally, the burying of an oxide layer within the silicon substrate. This layer of oxide blocks unwanted flow of current, thereby reducing current leakage. Intel plans to commence the production of TeraHertz transistors before the end of this decade.

As the name indicates, a tri-gate transistor has three gates. The gate



Images courtesy Intel.com

Magnified image of the microscopic Intel tri-gate transistor as seen through an electron microscope

controls the flow of current from the source to the drain in a transistor. Use of multiple gates increases the current flow. IBM and AMD are also working on multi-gate transistors. In September 2002, AMD claimed that it had developed a double-gate transistor. A year later, it announced that with the help of IBM, it plans to use tri-gate transistors in its chips. Like other innovations, this technique is also compatible with existing manufacturing facilities. "This multi-gate transistor implementation is highly compatible with current manufacturing techniques, which improves our ability to put this technology into high-volume production." says Craig Sander, vice-president of process technology development for AMD.

New lithography techniques

Currently, optical lithography is used to manufacture chips. A combination of a light beam, mask and photo-resist is used to build layers on substrate's surface and etch transistors and their connections. As the size of the transistors keeps getting smaller, the lithography process should be modified. Deep Ultra Violet Lithography (DUVL) employs Deep Ultra Violet (DUV) beams with a wavelength of 248 nm. DUVL allows manufacturers to print circuits as narrow as 0.1 µm. To print circuits smaller than that, manufacturers will have to look for alternatives. Extreme Ultra Violet (EUV) lithography seems a likely successor to DUV. It's possible to print circuits up to 0.03 µm using EUV, since its wavelength is around 13 nm. Although they might sound similar, DUV and EUV technologies have a lot of difference between them. This is because the EUV portion of the electromagnetic spectrum is vastly different from the UV and visible light spectrum. One of the challenges posed by EUV Lithography (EUVL) is that the optics used in the manufacture should have unprecedented levels of accuracy. There are many technical hurdles like these that have to be crossed for it to be implemented.

There are other lithography techniques such as X-ray lithography, ion beam projection lithography, and immersion lithography that may come in EUVL's way. Immersion lithography shows a lot of promise. Its principle is to improve the resolution of optical lithography by using a thin layer of pure water. If this is successful, then it may make EUVL redundant, or delay its implementation.

www.research.ibm.com

Apart from silicon germanium technology and VLSI design aitomation, this Web site is crammed with information about storage, data management, and leading-edge application research that IBM is doing.

www.intel.com/research

This is another Web site that goes into the nitty gritties of nanotechnology and silicon. It also has tickers on Intel news and upcoming events.

Joint winners

Two observations can be made from what has been explained. One is that all these techniques will complement each other; there aren't many competing with one another. The second observation is that most of the developments have been made either by Intel or IBM, thanks to the billions of dollars poured into R&D by these companies. Other companies can't afford such huge bills and so, in the future, they will find it prohibitive even to build manufacturing plants. The not-so-famous Moore's Second Law states that the cost of building a new manufacturing plant will double every four years. Indeed, those costs have been spiralling and will continue to do so.

Here, a special mention should be given to other forms of computing such as quantum computing and biological computing. Although they are still in their infancy, they hold promise. If any of them fulfil what they predict, then we may probably have to dump all the current technology, but until then, the semiconductor industry will continue to travel at the rate demanded by Moore's Law.

MOULY ARUN PRABHU
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Sony DVD Handycam DCR-DVD300 Camcorder ▶▶
3-inch DVD memories

First, we will tell you that the DCR-DVD300 won the Innovations Design and Engineering award at the 2004 edition of the hip Consumer Electronics Show. Now, we tell you why: It records videos and still images on a three-inch DVD-R and DVD-RW media, and comes with a powerful Carl Zeiss Vario-Sonnar lens along with a Super Nightshot 0 Lux recording system that captures images at even 10 feet in total darkness. It has in-built SteadyShot technology, and allows in-camera editing. Connects to a PC using a USB 2.0 interface. Now you know!

Price: US$1,099

CES Rocks!

The Consumer Electronics Show at Las Vegas showcases only the very best of products. Here come the digital objet d'arts for a lifetime

◀◀ Klipsch KES-6100-THX System
Popcorn not included

Imagine a universal DVD player that accepts SACD and DVD-Audio. Imagine six 100-watt speakers, a 5.25-inch aluminium woofer, and a 300-watt subwoofer with eight-inch aluminium output woofers. Imagine four exteral A/V inputs that have a mouthful of certifications—Dolby Digital EX, ProLogic IIx and THX, among others. Now imagine this supercreature a reality.

Price: US$4,000

Sanyo Fisher FVD-C1 Pocket Camcorder ▶▶
Rolls out the tapes

Ladies and gentlemen, we have another CES Innovations winner on our hands! Sanyo Fisher's latest pocket camcorder gives you DVD-quality MPEG-4 video and high-resolution still images on a tape-free platform, thanks to its 512 MB SD memory card that stores more than 30 minutes of video, or around 500 images. It also gives CD-quality audio reproduction, 5.8X optical zoom and USB 2.0 connectivity. All this at a weight of just 153 gm. How cool is that?!

Price: US$899.95

◀◀ Gibson Wurlitzer Digital Jukebox

Don't pop in the dimes

A shrewd businessman may use this to skyrocket his revenues. This jukebox is so sexy, it might tempt people to keep popping money at it to listen to more music. It has 145-watt three-way speakers, an 80-GB hard drive, supports MP3, WMA and uncompressed audio, and can stream music to other Wurlitzer receivers. It comes with a universal remote to monitor the jukebox. Oh, and did we mention that it won Best of Innovations award at CES 2004?!

Price: NA

Panasonic DMC-FZ10 Lumix Digital Camera ▲▲

Shoot me, up close

Distance? What's that? Just the question a Panasonic DMC-FZ10 user would ask, thanks to its humongous 12X optical zoom. This 4-megapixel camera also comes with other goodies such as the precision Leica DC Vario-Elmarit lens, Panasonic's advanced Mega Optical Image Stabiliser (OIS) technology and a no-lag processing speed. Not surprisingly, it won the Honoree award in the Innovations Design and Engineering category at the CES 2004.

Price: US$599.95

◀◀ Logitech diNovo Media Desktop

Not your old Remington Rand

If input devices were supermodels, this one would be Tyra Banks. This beauty is Bluetooth enabled, and the MediaPad features an interactive display to show instant messages and answer e-mails. This four-component device lets you control streaming audio, run a print job and even play games. It picked up the Best Innovations award for computer hardware at CES 2004.

Price: US$249.95

IMAGING Solomon Lewis

Finance Minister Jaswant Singh's pre-election bonanza for consumers means you can buy PCs, laptops mobile phones and even DVDs at never-before prices. Are you heading for the nearest store yet?

An eminent Indian economist once said: "In India, development takes place once every five years." He was obviously referring to election economics, a once-in-five-years *tamasha* of the great Indian democracy, when politicians suddenly remember the populace that voted them into power. But surely, cynicism is not the order of the day in the first decade of the 21st century—India is developing at a much higher pace than the infamous "Hindu rate of growth", a term coined by economist Raj Krishna—interest rates are at an all-time low, the BSE Sensex is at an all-time high, and wonder of wonders, even the Indian cricket team has the might to take on the best in the world.

Perhaps, this is why, Finance Minister Jaswant Singh's pre-election treat for the IT industry, though as exquisitely timed as a V V S Laxman leg glance, is not looked upon with too much derision—it serves as the perfect foil to the national sentiment that the middle class is finally getting its due.

Singh made the first round of duty cuts on January 8, 2004, when it was amply clear that this year's Budget would be postponed due to early elections. It took a long time coming for consumers, but the halving of excise and customs duties, and the elimination of special additional duty (SAD) on desktop computers, laptops, cellphones and optical media products such as pre-recorded DVDs and VCDs, was good news.

For instance, the Customs Duty on cellphones was reduced from 10 per cent to five; the excise duty on computers was halved from 16 per cent to eight. He abolished any duty on imports of pre-recorded DVDs and VCDs. And as the icing on the duty-cuts-cake, Singh even allowed people flying in from abroad to carry one laptop in—no questions asked if it is carried as part of the baggage.

Wow, that's good, isn't it?

Well yes, but it was not so for quite some time for consumers. Despite the finance minister's announcement, manufacturers were still wary of announcing price cuts for more than 10 days, until the first cookie crumbled in the form of Philips, which cut its prices of LCD monitors between five and 20 per cent, and that of CRT monitors by three to four per cent. Ironically, the minister did not cut any duty for monitors, but consumers could finally expect something concrete. In fact, for one LCD monitor—the Philips 170S4—the price came down from Rs 27,000 to Rs 23,000. Later, Dell announced a 11 per cent price cut on some of its desktops, servers and notebooks. Mid-January, LG also announced price-cuts on its LG My PC range of computers.

Says Vinnie Mehta, Executive Director, Manufacturers Association of Information Technology (MAIT): "These average price cuts of eight to 10 per cent will not only benefit end-users, but also boost the IT industry in India. They will be able to offer more to Indian consumers. The industry believes that there will be a rise of 35 to 40 per cent in sales, up from the 30 per cent they expected before the duty cuts."

However, until this article went into print, only a handful of companies, namely, Dell, Kobian, Nokia, Zenith, LG and Philips actually effected a price-cut. Zenith, perhaps India's largest manufacturer of aggressively-priced PCs and laptops, announced a price-cut just two days, but refrained from giving actual figures. Says Devita Saraf, Marketing Director, Zenith Computers, "The new duty structure may cause PC prices to reduce by as much as 10 to 12 per cent." A K Patni, Managing Director, PCS Industries, another low-priced-products manufacturer, agrees: "PCS will cut its prices between 10 and 14 per cent soon." HCL Infosystems Chairman and

CEO Ajai Chowdhry says, "Lower prices will mean greater PC penetration, because the middle class would be able to afford PCs in bigger numbers."

Do these cuts mean that we will finally see the dream sub-Rs 15,000 PC? Saraf says Zenith may bring down the price of its entry-level PC to Rs 16,000, from the present Rs 18,000. This decision may be helped because the interim confusion whether the duty-cuts are only on finished products, or components such as microprocessors, storage devices, or even CD-ROM drives, has been cleared—they will apply to both components, as well as finished products. Even then, duties on monitors and motherboards have been excluded from Singh's box of goodies.

Vinnie Mehta

Executive Director, Manufacturers Association of Information Technology (MAIT)

> "The industry believes that there will be a rise of 35 to 40 per cent in sales, up from the 30 per cent they expected before the duty cuts"

Some feel that it will take around four to five weeks before prices settle down across the board. Says Rajendra Kumar, Vice President, Frontline division, HCL Infosystems, "It might take a while before every player announces a price-cut, because one will have to study the implications in detail. However, I am sure that people will get more value for money, as high-end products will probably be available at the same price. And since there will be greater competition between branded manufacturers and assemblers, the grey market might take a beating in the long run."

Says Rohit Jain, Business Manager, IBM Global Services: "PC buyers are extremely price sensitive. A commercial desktop may now be available at below Rs 40,000 from the earlier Rs 45,000 to Rs 50,000."

Cheaper mobile phones, too

And now for the biggest present of them all: Customs duty on cellphones has been halved to five per cent. This means that the price differential between the white and grey market will be minimal, finally giving manufacturers the boost they needed to push products in India. Consumers now get more than a cellphone at a lower price—they get a warranty and service too.

Nokia and Sony Ericsson India have already announced price-cuts—an entry level Nokia 3315 will now cost Rs 3,710 in New Delhi, and slightly higher (Rs 3,999) in Mumbai, due to the difference in sales tax. The cuts are higher for high-end models. Together with West Bengal, Uttar Pradesh, Haryana and Rajasthan, New Delhi will be among the cities that will have the cheapest cellphones. Industry sources say that this move makes mobile phones in India cheaper than many Asian countries, including Singapore.

HCL's Chowdhry, whose company also distributes Nokia's products in India, feels that the price-cuts will help increase cellphone penetration in the country. "Already cellphones are outselling landlines. This rate will go up."

Sony Ericsson India General Manager, Sudhin Mathur, feels that this cut will boost official sales, and prices of handsets will easily come down by five to 10 per cent soon.

Affordable laptops? Thanks to Singh, laptops will easily cost eight to 10 per cent less. Effectively, instead of buying a laptop in India, you can ask a friend or a relative returning from a trip abroad, to carry it for you, at a lesser price. Manoj Khanna, spokesperson for Computer Media Dealers Association (CMDA), says, "Relaxation on baggage rules will make laptops more affordable. Overseas, every student has a laptop, which he or she takes to the classroom. With the new rules, the same concept will be ushered into India, sooner or later."

There is a rider, though. One of the biggest issues with laptops is servicing. Samsung has officially stated that it will not service products bought abroad in India, unless they have a global warranty, which basically brings the consumer back to square one. Rajendra Kumar of HCL, however, feels that this will actually help the local laptop market to grow at a much higher rate of 15 per cent, compared with the current rate of four to five per cent.

But Amar Babu, Intel's Director for South Asia sales, says, "In India, corporates are major buyers of laptops, not individuals. So, this decision to relax baggage rules will not create a big impact. Laptops are just not price-sensitive, and service actually plays a bigger role." Zenith's Saraf agrees: "Most vendors will not give warranty on these laptops. So the user has not much to gain."

Budget Buzz

The release of the mini-budget has everyone in IT shouting out opinions. Even the Digsters on the Digit Forum (***http://www.thinkdigit.com/forum***) had opinions to share. A look at a few opinions voiced on the forum:

There have been more duty cuts on almost all PC components! The duty on microprocessors has come down from 16 per cent, to zero per cent. The same applies to CD-ROMs, floppy drives and hard disks. This means, the rate of a microprocessor will fall to Rs 1,500 and Rs 2,000 per chip, but the duty on motherboards has not been cut. Thus, for about Rs 40,000, we will save around Rs 5,000. THIS IS THE PERFECT TIME TO BUY PCs!!!

sunmysore, *In-House Geek, Location: Mysore, Karnataka*

Hey what about GPU cards?

techno_funky, *In-House Geek*

Something like a price cut of about Rs 25,000 on 9800 Pros (realistically about 5,000), would be welcome!

TheMask, *Digitized!, Location: Mysore, Karnataka.*

It seems motherboards haven't been touched by these cuts.

svenkat83, *In-House Geek, Location: Chennai*

The only thing that would make things clear is holding off your purchase for a couple of weeks...

TheMask, *Digitized!, Location: Mysore, Karnataka.*

Despite all this, Devdatta Rivonkar, a Mumbai-based business analyst, says, "I wanted to buy a desktop, but now I think I will put in some more money, and go for a laptop from abroad. I don't mind if the warranty is not applicable here, as laptops generally don't give problems if used with care."

In midst of all the celebrations, Acer's S Rajendran points out a caveat: "This could encourage the grey market. The government should have a robust prevention mechanism. For the Indian customer, 'touch and feel' is still an important step in the purchase ritual. With PC penetration in single digits (about six to seven per 1,000), India still has a long way to go before an evolved buying behaviour can be expected."

The eternal question

When making an IT-purchase decision, the Indian buyer has two options—should I buy a branded product, or should I get it assembled from the neighbourhood engineer? With assembled PCs contributing to over 55 per cent of the market, branded computers have a lot to fight, as reflected in our Service and Reliability Survey in the January 2004 issue.

Most consumers believe in assembled PCs, which is evident in the fact that they contribute to over 55 per cent of the total market. However, consumers who want branded computers may be at an advantage now, and users may prefer them for their apparent reliability.

Says Rohit Jain, business manager, IBM Global Services—"We will have a more open regime, definitely. An eight per cent price advantage will force manufacturers such as Dell to open a local shop in the country, besides providing an added advantage to local manufacturers such as Zenith."

On the other hand, Sunil Sharma, Managing Director of Kobian feels that, "Assemblers will still have the advantage because of their level of customisation. They are also good when it comes to service, as they are just a phone call away, and you don't need to keep calling them either."

Buyer Rish Raj Jain from Sagar, Madhya Pradesh agrees saying, "With an assembled PC, I choose what I want. Except for Dell, branded PCs don't give me options." He has another problem. "In small towns such as mine, there are no MNC service providers. So if something goes wrong with my branded PC, my dealer will send it to Bhopal or Delhi, and my work will suffer for 20 to 30 days. However, if I buy it from local assembler, I get instant service."

But even in big cities, the question is will MNC products match prices with their Indian counterparts? V Ranganathan, Chairman and Managing Director of Cerebra Integrated Technologies Ltd, an Indian manufacturer, says, "With most MNCs setting up manufacturing facilities in India, they will sell at the same level as Indian brands. Those importing machines will find it cheaper, and the gap between domestic brands and imports will reduce considerably."

Ram Agarwal
Chairman and Managing Director, WeP Peripherals

> "We will be able to catch up with China in terms of per capita PC penetration faster"

What does it mean to you and me?

Until now, the duty structure in India discouraged people from buying laptops abroad. For instance, there was 16 per cent Customs Duty, 8 per cent Special Additional Duty and 16 per cent Countervailing Duty (CVD), i.e., a duty on imports similar to excise duty levied on domestic products. "Which essentially meant," says IBM's Rohit Jain, "that a laptop bought for $1000 in the US would cost around $1800 here. The waiver of these duties will keep price difference to the minimum."

Ram Agarwal, Managing Director of the Bangalore-based WeP Peripherals, is unhappy. He says, "Excise duty has not been reduced for computer peripherals such as printers, monitors, etc. Customs duty on finished computer products has been reduced from 15 per cent to 10 per cent, but the duties on many parts of computers and printers (such as print-heads), have been maintained at five per cent, thereby putting local computer manufacturers at a disadvantage as opposed to importers. We will not be able to pass on benefits to consumers."

And what about VCDs or DVDs?

One of India's largest distributors of pre-recorded VCDs and DVDs—Muslim Kapasi of Excel Video—says that the government has abolished the 16 per cent Excise duty on the cost of VCDs and DVDs. But royalty, sales tax and indirect taxes still apply. For a distributor, this means a saving of only seven per cent. "But I don't think any benefits will be passed on the consumers, as distributors will now use the money to revive an ailing industry and to combat piracy. Prices will be reduced only in the long term. He says that even if Indians shop from sites such as amazon.com, the DVDs will violate territorial rights, and sometimes even the Customs may confiscate them as they may not have clearance from the Censor Board of Film Certification."

Therein lies the rub: No customs duty on DVDs, but customs may not clear it for censorship reasons; no customs duty on laptops, but no after-sales support here without a global warranty that comes at a premium; no reduction in duties for monitors, a component that can constitute nearly 30 per cent of your low- to mid-range desktop PC. So, where does that leave you and me, the common Indian consumer? For this, we have to reach out for the worn-out cliché—wait and watch.

UPENDRA SINGHAI

A Quick Guide

BRANDED PCS	DUTY REDUCTION
Hard disks, floppy drives, CD-ROMs, CPU	Customs duty down to eight per cent from 16 per cent, SAD (four per cent) abolished. Excise duty halved to eight per cent on PCs
Cabinets, SMPS, speakers, RAM, LAN cards, hubs, switches, motherboards, UPS, headsets	Custom duty and SAD abolished SAD abolished, Custom duty still 16 per cent
Mobile phones	Custom duty down to 5 per cent from 10 per cent
Pre-recorded VCDs and DVDs	16 per cent Excise on Product Cost abolished

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

A Board's-eye View

Your motherboard decides whether your spanking new Pentium 4 or Athlon XP runs as it's supposed to. Will it last you through a few upgrades? Is there one that fits your budget? We test 49 of the best to find out just that

IMAGING: Solomon Lewis, PHOTOGRAPHER: Mexy Xavier

Motherboards, or Mainboards as they are referred to, are the foundation on which your computer system is built, and enable you to connect various external devices to it. Its sheer indispensability calls for better understanding this component, so that you can make a wise decision before buying one. If you're an enthusiast, you may want a motherboard that you can push to the limits; if you only want something that's steady and reliable for everyday tasks, you need to first realise what those tasks are, and buy accordingly.

The year 2003 was quite fruitful in terms of the number of technologies making it to the desktop level. The introduction of new flagship chipsets from Intel—the 865 and the 875P—for their newer 800 FSB processors, and the percolation of dual-channel memory support for mainstream desktop boards, pushed the performance envelope even further. For the AMD platform, you have the KT600 chipset from VIA, which increased the chipset line-up for AMD processors. nVidia's nForce2 chipset, holds its fort as the best AMD platform. And finally, the introduction of 64-bit computing from AMD. With so much happening in such a short span of time, choosing the right board has become all the more difficult.

So, we thought it about time to test the range of motherboards available to Indian assmblers. We decided against a comparison of AMD's Athlon 64-bit motherboards, simply because of the lack of availability of the required registered memories, and the immaturity of this platform in the Indian perspective. We decided to round up these boards in the not-too-far-away future, as and when it's a little more feasible.

Like every other piece of hardware, motherboards are also bringing down their prices. The low-end segment, which was once dominated by the likes of Mercury and HiS, has been the one to most reflect the price drop. In India, this is a segment with great volumes of sales, which has attracted big players in the form of ASUS, Gigabyte and MSI—albeit at slightly higher prices. Even Intel couldn't resist, and now there are original Intel motherboards available at the lower-end of the motherboard see-saw. The cheapest motherboard we got was priced at a relief-giving Rs 2,350, meaning a sub-Rs 22,000 Pentium 4 system, can safely be called yours.

Though the mid-range segment in this test will lighten your pockets by Rs 7,000 or Rs 8,000, you are the proud owner of a board that has a plethora of features—especially those based on the nForce chipset. The high-end boards still cost above Rs 10,000, but contribute immensely to building your dream PC, that will give you immense boasting-minutes until the next upgrade is forced upon you. Apart from the 49 motherboards that we tested, we also featured three not-so-run-of-the-mill motherboards for their sheer uniqueness. Strap up for the ride.

A year ago, the average price of a low-end board was about Rs 4,000. Today, the cheapest board—the Mercury PVM266AM-L—costs a meagre Rs 2,350 and goes up to an affordable Rs 4,900. With this board as your substrate, you can assemble a complete PC for as little as Rs 20,000. Will such a PC do for an average user? Will it make a good home PC? These are the questions we kept in mind while testing this category.

Take a quick look at the score board, and you'll see that three to four chipsets are predominantly used in this segment. The Intel 845 chipset-based motherboards were dominant—two thirds of the boards were based on it. The VIA P4M266A was also popular, and the 650 chipset from SiS was used on two boards. There was also an 865-based board stripped to the bare necessities.

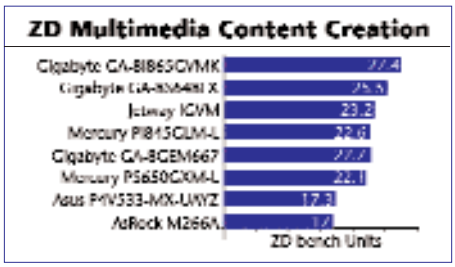
Features

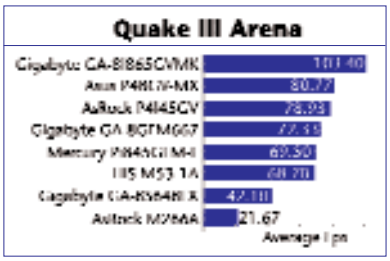
The low-end boards have decent features—six USB ports, an AGP slot, and onboard LAN. All the boards were based on Micro ATX form factor, and hence the component layout was quite cramped. The boards with an AGP slot were worse—the memory slot locks interfered with the AGP card. Boards from AOpen, ASUS, Gigabyte, Intel and Mercury displayed better component layout. The layout on the Jetway-P4MDUT was a complete mess, with capacitors in all the wrong places.

The ASRock M266A motherboard has a micro ATX form factor and hence comes with a cramped layout

Most of the Intel chipset boards were based on the value 845GV chipset. This offers good features with acceptable performance. Except for three boards—Intel 845GVSR, HIS 53-1A and Jetway IGVM—all the others had onboard LAN. Most of the Intel-based boards supported DDR 333 MHz RAM, while the VIA P4M266 chipset boards supported DDR 266 MHz. The Asrock M266A had support for both DDR 266 MHz, as well as PC 133 SD-RAM—a boon if you want to upgrade at minimal costs. The three different boards based on the three different SiS chipsets, supported DDR 266 MHz to DDR 400 MHz RAM. Only two boards—Gigabyte's GA-8I865GVMK (based on 865 chipset), and their GA-8S648FX (based on the SiS 648FX chipset), supported a 800 MHz FSB CPU and DDR 400 MHz memory.

The 865 chipset board landed in this category only because of the lack of an AGP slot. Some boards such as those from Gigabyte, ASUS and AOpen did have BIOS overclocking options. The VIA and SiS chipsets scored over the Intel-based boards as they had 4X, and in some cases 8X, AGP slots. However, a 4X slot isn't really much of a boon because most AGP cards available today are 8X-compatible; so a 4X card would only give you marginally better graphics than the onboard graphics sub-system.





As far as packaging was concerned, all the boards came with the standard pair of IDE cables for hard disk and floppy drives, rear panel plate and manuals. The AOpen board had just a quick start guide, with the complete manual on the CD—how they expect you to look up jumper settings before you assemble your computer is a complete mystery!

Performance

The low-end category caters to those who require a PC for word processing, browsing, listening to MP3s and playing a few graphically unchallenging games. Price is the most important factor here, and we took into consideration that the total budget for a PC based on these motherboards shouldn't cross Rs 20,000. Also, the machine should also be able to last a few years without an upgrade.

The real-world test gauges how good a board is at day to day activities. In content creation, Gigabyte's GA-8I865GVMK scored a superb 27.5. This was due to the 865 chipset, and its high memory bandwidth. The board from Gigabyte—the GA-8S648FX—based on SiS 648FX chipset with similar specifications, came in second. The MSI and Jetway's IGVM tied for third spot with scores around the 23 mark—a good performance for boards based on 845 chipset.

In the Business Winstone benchmark, both the Gigabyte boards took the top honours—clearly indicating what the extra memory bandwidth can do for you. The Gigabyte GA-8GEM667, based on Intel 845GE chipset, came in third. The ASUS P4BGV-MX did a decent job as well. The lower memory bandwidth of the VIA chipset boards created a bottleneck for memory-intensive applications and tasks, putting office applications out of their range.

No prizes for guessing who encoded the fastest—it was the duo from Gigabyte again! The VIA chipset-based motherboards came in last, while the 845 chipset based ASUS and Gigabyte GA-8GEM667 managed to do the job fairly quickly.

In the synthetic test, especially the PC Mark benchmark, which yields a unified score, the same fact came to light. Gigabyte's GA-8I865GVMK yielded more points that any other board. The reason was the dual-channel implementation of memory on the 865 chipset. The VIA chipset based boards were a disappointment again, owing to completely outdated 266 MHz memory bus. In the Intel 845 clan, Gigabyte's slightly better 845GE chipset motherboard topped. All the boards were on par in the

How We Tested

We segregated the motherboards into two distinct platforms—Intel and AMD. Based on the price, we split each into three categories: low, mid and high.

The low-end category consisted of motherboards that fall within the Rs 5,000 range, whereas the mid-end encompassed those with a price tag of up to Rs 10,000. Anything above this was slotted in the high-end category.

All the low-end boards were benchmarked using 512 MB DDR 266 MHz, a Pentium 3.06 GHz or an Athlon XP 2400+ processor and onboard graphics.

The mid-range boards were tested using 512 MB of DDR 400 MHz, a Pentium 3.2 GHz or an Athlon XP 3200+ CPU and a Gigabyte Radeon 9600 Pro graphics card.

A Pentium 3.2 GHz or Athlon XP 3200+ CPU, 512 MB of DDR 400 and a Gainward FX 5950 Ultra display card formed the test bed for the high-end category.

All the boards were tested using Seagate's 40 GB 7200-rpm IDE drives. We chose Windows XP Professional with SP-1 as the operating system, and installed the latest drivers for chipsets and displays.

Benchmarks

We segregated these tests into real-world and synthetic tests. Here, many new benchmarks such as PCMark 2004, Ziff Davis Suite 2004 and SiSoft Sandra 2004 were included.

Synthetic tests

PCMark 2004: A new avatar of the older PCMark 2002, this test has 70 new tests that benchmark the entire system and give a unified score. You can also run tests that give individual sub-system

PCMark 2004 is a complete system benchmarking suite

scores for CPU, graphics, memory, hard drives, etc. The tests mainly comprise applications such as WinZip used on a day-to-day basis. Scores are generated depending on the system performance in each individual tests.

3D Mark 03 and 3D Mark 2001 SE: Both these synthetic benchmarks from Future Mark are widely used to benchmark graphical sub-systems. Both were patched with the latest upgrade patches from FutureMark.

3D Mark 2001 SE was not used on high-end systems, just as 3D Mark 2003 was not run on low-end motherboards since it would skip most of the tests on onboard graphics—both were run on mid-range systems.

SiSoft Sandra 2004: This is the same old benchmarking tool with newer features and added tests. The interface has also been touched up a little. There's a new user interface and an extra benchmarking tool for USB drives, cache memory, etc. The internal database has been revised for comparing with new processors, memory standards and newer chipsets. We logged scores particularly related to the CPU, memory and the disk drive.

SiSoft Sandra 2004 has a new user interface and additional tests bundled along

Real-world tests

Ziff Davis Suite 2004: The Ziff Davis Suite 2004 consists of the Multimedia Content Creation and Business Winstone benchmarks. While PCMark 2004 just uses the necessary sections of Adobe Photoshop, MS Office, etc, this test suite installs entire applications to simulate real world conditions. Multimedia Content Creation runs Adobe Photoshop, Adobe Premier, sound-editing applications, etc; whereas Business Winstone runs MS Office, and makes use of features such as file-zipping, etc, to simulate its performance when used on a daily basis. The unified score reflects the performance of the system as a whole unit.

UT 2003: Based on DirectX 8.1, it was used to stress the graphic sub-system of the motherboard. Here, we logged the Flyby demo fps. *UT 2003* was used only for the mid-range and high-end category. This benchmark is quite heavy in terms of graphical requirements, hence, running it on low-end motherboards would not yield proper results.

Serious Sam 2: *Serious Sam 2* was used to check how well the graphical sub-system performs in OpenGL environments. We logged a score for resolutions up to 1024 x 768 x 16 for low-end motherboards that used onboard graphics. We tested the high-end motherboards for a resolution of 1600 X 1200 X 32.

The logic used was that the enthusiast would definitely like to play games at higher resolutions on the mid-range and high-end boards.

Quake III Arena: This is the grand daddy of all game benchmarking tools. It's based on the OpenGL environment, and holds fort due to its super-oiled engine that scales true to any hardware changes done to the system. We followed the same procedure used in *Serious Sam 2* to log scores for *Quake III Arena* too.

The gaming scores mentioned in the table are the averages of frames per second (fps) obtained at various resolutions.

Video Encoding: We encoded a 50 MB MPEG file to DIVX using VirtualDub and used the DivX 4.01 codec for the process. The time taken to complete the job was logged, and then compared.

SCORE BOARD

CATEGORY	LOW-END INTEL MOTHERBOARDS						
Brand	AOpen	ASRock	ASUS	Gigabyte	Gigabyte	HIS	HIS
Model	MX4GVR-GN	P4I45GV	P4BGV-MX	GA-8I845GV	GA-8GEM667	M48-E1	M53-1A
Chipset	Intel 845GL	Intel 845GV	Intel 845GV	Intel 845GV	845GE	Intel 845GLX	Intel 845GV
Interface type	Socket 478	Socket 478	Socket 478	Socket 478	Socket478	Socket 478	Socket 478
FEATURES (20 %)							
CPU speed (GHz) / FSB supported (MHz)	P4 3.06 / 533	P4 3.06 / 533	P4 3.06 / 533	P4 3.06 / 533	P4 3.06 / 533	P4 3.06 / 533	P4 3.06 / 533
Memory speed (MHz)/ Memory slots (Nos)	DDR 333 / 2	DDR 333 / 2	DDR 333 / 2	DDR 266 / 2	DDR 333 / 2	DDR 266 / 2	DDR 266 / 2
Form factor	Micro ATX	Micro ATX	Micro ATX	Micro ATX	Micro ATX	Micro ATX	Micro ATX
AGP slot / Onboard AGP	✗/✓	✗/✓	✗/✓	✗/✓	✓ / ✓	✗/✓	✗/✓
PCI Slots	3	2	3	3	3	2	2
Onboard Sound	✓	✓	✓	✓	✓	✓	✓
USB ports / Rear / Ports Via Cable	6/4/2	6/4/2	6/4/2	6/2/4	6/2/4	6/2/4	6/2/4
Ethernet	✓	✓	✓	✓	✓	✓	✗
HyperThreading Support	✓	✗	✓	✓	✓	✓	✗
Core voltage adjustment	✓	✗	✓	✓	✓	✗	✗
Frequency adjustment	✓	✗	✓	✓	✓	✗	✗
Component layout on the motherboard (S05)*	3	3	2.5	2.5	3	3	3
Package contents							
Manual / CDs	✓ / ✓	✓ / ✓	✓ / ✓	✓ / ✓	✓ / ✓	✓ / ✓	✓ / ✓
Necessary cables provided	✓	✓	✓	✓	✓	✓	✓
PERFORMANCE (80 %)							
Gaming Benchmarks: Serious Sam Second Encounter							
Average fps	25.70	28.47	32.10	27.80	31.67	26.97	26.77
Quake III Arena							
Average fps	68.50	78.93	80.77	60.00	72.33	66.13	68.70
Real World Benchmarks							
ZDbench Content Creation 2004	22.7	Failed	Failed	22.1	22.7	22.7	22.6
ZDbench Business Winstone 2004	18.9	19.3	20	17.5	21.3	18.4	18.1
Video Encoding (Time in secs)	103	95	89	106	89	101	100
Synthetic Benchmarks							
3D Mark 2001 SE (patched for onboard without AGP slot)	1,545	1,533	1,836	1,422	1,532	1,534	2,737
PCMark 04							
CPU index	3,564	4,320	4,079	3,589	3,627	3,568	3,569
Memory index	2,397	2,508	2,279	1,661	3,178	2,363	2,411
Graphics	483	539	617	438	498	475	489
Hard disk index	3,321	3,300	3,384	3,298	3,865	3,329	3,351
Total Score	2,766	3,390	3,228	2,557	3,745	2,731	2,802
Sisoft Sandra 2004 Professional: CPU sub-system							
CPU Dhrystone/Whetstone	7,175 / 2,051	9,481 / 3,676	7,889 / 2,262	7,128 / 2,058	7,202 / 2,070	7,023 / 2,055	7,073 / 2,055
Multimedia - CPU Integer / FPU SSE	17,240 / 20,424	23,570 / 32,950	19,042 / 22,519	17,297 / 20,396	17,373 / 20,586	17,244 / 20,409	17,240/20,421
Memory sub-system							
ALU / RAM	1,648	1,663	2,197	1,475	2,143	1,637	1,656
FPU / RAM	1,651	1,661	2,198	1,474	2,145	1,637	1,657
Disk drive							
Drive Index MBps	24,588	26,500	26,535	26,775	26,543	26,340	27,654
OVERALL SCORE							
Performance	46.44	41.35	42.86	44.37	51.53	46.38	50.10
Features	12.80	9.80	9.50	11.50	13.80	9.80	7.80
Grand Total (Performance + Features)	59.24	51.15	52.36	55.87	65.33	56.18	57.90
VFM (Index)	12.34	17.05	13.25	16.43	13.33	18.12	17.54
Price (Rs)	4,800	3,000	3,950	3,400	4,900	3,100	3,300
Grade	B-	B+	B-	B	B-	B+	B+

Scale of 5

Know the Plan

Many enthusiasts like to install a larger heatsink fan on their motherboards for assured cooling. In fact, some of them go to the extent of actually investing an extra thousand bucks for the sake of a cooling fan.

However, picture this: You get the coolest looking cooling-combo from abroad, and to your dismay find that there is not enough space around the CPU socket to plug the cooler. This is a common problem with the motherboard layouts. Lesson learned: Always make that the CPU area is devoid of any obstructive capacitor so that you can use a larger heatsink fan combo. Some manufacturers resort to another implementation that places the heatsink perpendicular to the line of capacitors around the CPU area—a good design since the capacitors are on the sides and do not come in the way, when installing or removing the combo.

Another common problem is the placement of the AGP slot relative to the memory slots. Many badly designed boards have the AGP-slot lock interfering with the memory-slot locks. This makes it impossible to remove the RAM modules without unplugging the display card first. Also, certain boards have a tiny capacitor near the AGP lock that is a constant source of irritation when unplugging high-end display cards such as the GeForce4 Ti.

If you use a standard-size ATX cabinet, check the position of the ATX power

LOW-END INTEL MOTHERBOARDS

Intel	Jetway	Maxforce	Mercury	MSI	Gigabyte	ASRock	ASUS
D845GVSR	IGVM	MS-6714	Pi845GLM-L	MS-845GVML	GA-8I865GVMK	M266A	P4V533-MX-UAYZ
VIA KM400	Intel 845GV	Intel 845GV	Intel 845GL	Intel 845GV	Intel 865GV	VIA P4M266A	VIA P4M266A
Socket A	Socket 478	Socket478	Socket 478	Socket 478	Socket 478	Socket 478	Socket 478
P4 3.06 / 533	P4 3.06 / 533	P4 3.06 / 533	P4 3.06 / 533	P4 3.06 / 533	P4 3.2 / 800	P4 3.06 / 533	P4 3.06 / 533
DDR 333 / 2	DDR 266 / 2	DDR 333 / 2	DDR 266 / 2	DDR 333 / 2	DDR 400 / 4	DDR 266 and SD PC133 / 4	DDR 266 / 2
Micro ATX	Micro ATX	Micro ATX	Micro ATX	Micro ATX	Micro ATX	Micro ATX	Micro ATX
✗/✔	✗/✔	✗/✔	✗/✔	✗/✔	✗/✔	✔/✔	✔/✔
3	3	3	3	3	3	3	3
✔	✔	✔	✔	✔	✔	✔	✔
6/4/2	6/2/4	6/4/2	6/4/2	6/4/2	8/4/4	6/4/2	6/4/2
✗	✗	✔	✔	✔	✔	✔	✔
✗	✗	✗	✗	✔	✔	✗	✔
✗	✗	✔	✗	✗	✔	✗	✔
✗	✗	✔	✗	✗	✔	✗	✔
3	3	2.5	3	2	2.75	3	2.75
✔ / ✔	✔ / ✔	✔ / ✔	✔ / ✔	✔ / ✔	✔ / ✔	✔ / ✔	✔ / ✔
✔	✔	✔	✔	✔	✔	✔	✔
17.37	29.77	23.87	27.70	26.77	39.93	19.40	18.30
53.43	62.27	69.07	69.50	68.80	103.40	21.67	21.90
Failed	23.2	16.5	22.6	23.3	27.4	17	17.3
12.8	18.9	15.9	18.8	18.3	21.9	13	12.6
115	100	124	103	101	71	154	153
1,324	1,476	1,524	1,527	1,534	3,006	468	400
3,151	3,669	3,567	3,574	3,556	4,911	3,950	3,876
2,084	2,374	2,345	2,384	2,659	4,376	1,572	1,603
526	455	460	479	488	578	186	191
3,559	3,363	3,290	3,317	3,376	2,903	3,275	3,222
2,500	2,781	2,456	2,774	2,801	3,936	2,401	2,306
7,171 / 2,036	6,992 / 2,071	6,500 / 2,057	7,297 / 2,156	7,077 / ,2058	10,044 / 4,024	9,289 / 3,621	9,034 / 3,807
17,257/20,417	17,373/20,592	17,284/20,303	17,276/20,461	17,290/20,487	24,605/34,773	23211/33834	23,300/32,769
1,665	1,553	1,544	1,644	1,538	4,219	776	808
1,668	1,556	1,546	1,643	1,541	4,223	776	808
29,217	27,534	26,304	24,353	26,578	24,570	27,355	27,453
32.21	47.05	41.25	46.86	47.11	65.27	33.15	32.75
8.80	7.80	11.50	8.80	10.20	14.65	9.80	12.65
41.01	54.85	52.75	55.66	57.31	79.92	42.95	45.40
10.25	18.28	16.48	21.20	14.33	14.53	13.01	12.97
4,000	3,000	3,200	2,625	4,000	5,500	3,300	3,500
C+	B+	B+	A-	B	B	B-	B-

supply connector and the 12 V auxiliary power points on the board. If these connectors are on the other side of the cooling fan, the wires may get entangled with its blades, thus disrupting proper air ventilation near the CPU. Choose boards that have these power points on the extreme right-hand side away from the fan.

The IDE and floppy drive connectors can be a nuisance if they are too close to each other. Choose a board where these connectors are not placed linearly, but next to each other. In the new breed of boards that come with dual-channel memory, the RAM slots are too close to each other. Ensure that there is enough spacing between them. RAM modules with a heat spreader require adequate space for proper air circulation to dissipate the heat.

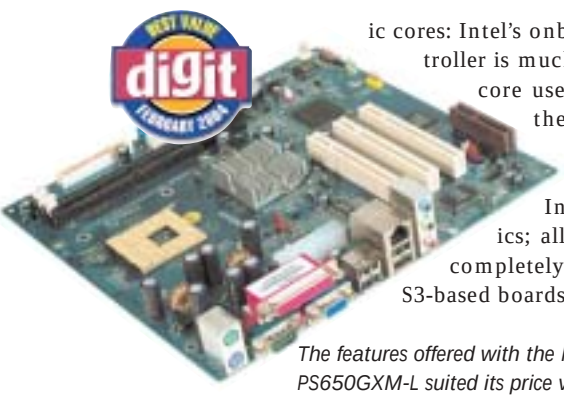
The Intel 865GV-based Gigabyte GA-81865GVMK has good features and performed well

I/O sub-system test. The gaming tests were run to gauge the difference between the Intel Extreme graphics integrated on the 845GV-based boards, and the S3 graphics used by the others. All the boards managed to run most of our gaming tests, but the gameplay was jerky, and at times unplayable. One interesting point is the difference in image quality between the two graph-

SCORE BOARD

CATEGORY	LOW-END INTEL MOTHERBOARDS					
Brand	Jetway	Mercury	Gigabyte	Gigabyte	Mercury	Gigabyte
Model	P4MDUT	PVM266AM-L	GA-VM533	GA-8S650GXM-P	PS650GXM-L	GA-8S648FX
Chipset	VIA P4M266A	Via P4M266A	VIAP4M533	SIS 650GX	SiS 650GX	SiS 648FX
Interface type	Socket 478	Socket 478	Socket478	Socket 478	Socket 478	Socket 478
FEATURES (20%)						
CPU Speed (GHz) / FSB supported (MHz)	P4 3.06 / 533	P4 3.06 / 533	P4 3.06 / 533	P4 3.06 / 533	P4 3.06 / 533	P4 3.2 / 800
Memory Speed (MHz) / Memory slots (nos)	DDR 266 / 2	DDR 266 / 2	DDR 266 / 2	DDR 333 / 2	DDR 266 / 2	DDR 400 / 2
Form Factor	Micro ATX	Micro ATX	Micro ATX	Micro ATX	Micro ATX	Micro ATX
AGP slot / Onboard AGP	✔/✔	✔/✔	✔/✔	✔/✔	✔/✔	✔/✘
PCI Slots	3	2	3	3	3	5
Onboard Sound	✔	✔	✔	✔	✔	✔
USB ports / Rear/ Ports Via Cable	6/2/4	6/4/2	6/2/4	6/2/4	6/2/4	6/2/4
Ethernet	✘	✔	✔	✔	✔	✔
Hyperthreading Support	✔	✘	✔	✔	✘	✔
Core voltage adjustment	✘	✘	✔	✔	✘	✔
Frequency adjustment	✘	✘	✔	✔	✘	✔
Component layout on the motherboard (S05)*	1.5	2.75	3	2.75	2	2.75
Package contents						
Manual / CDs	✔ / ✔	✔ / ✔	✔ / ✔	✔ / ✔	✔ / ✔	✔ / ✔
Necessary cables provided	✔	✔	✔	✔	✔	✔
PERFORMANCE (80%)						
Gaming Benchmarks: Serious Sam Second Encounter						
Average fps	25.95	21.73	25.67	17.93	15.10	18.10
Quake III Arena						
Average fps	30.37	23.20	32.23	43.33	36.00	42.10
Real World Benchmarks						
ZDbench Content Creation 2004	20.1	19.5	20.4	22	22.1	25.5
ZDbench Business Winstone 2004	14.5	14.5	14.9	18.4	18.8	21.4
Video Encoding (Time in secs)	112	124	111	106	153	89
Synthetic Benchmarks						
3D Mark 2001 SE (patched for onboard without AGP slot)	660	500	695	1,138	1,003	1,123
PCMark 04						
CPU Index	3,724	3,839	3,375	3,594	3,425	4,112
Memory Index	1,667	1,585	1,590	2,314	2,248	2,359
Graphics	245	194	252	528	514	512
Hard disk index	2,931	2,970	2,995	3,267	3,345	3,342
Total Score	2,630	2,451	2,604	2,759	2,696	3,822
Sisoft Sandra 2004 Professional: CPU sub-system						
CPU Dhrystone/Whetstone	7,856/ 2,256	7,696 / 2,245	7,815 / 2,233	7,139/ 2,069	7,176/2,056	7,892/2,271
Multimedia - CPU Integer / FPU SSE	18,958/22,411	18,835/22,313	18,767/22,095	17,369/20,506	17,293/20,491	19,105/22,506
Memory sub-system						
ALU / RAM	1,097	951	1,191	1,631	1,559	2,490
FPU / RAM	1,095	944	1,186	1,633	1,563	2,495
Disk drive						
Drive Index MBps	20,538	20,778	20,628	30,680	26,196	26,389
OVERALL SCORE						
Performance	36.42	34.94	37.68	43.44	40.42	48.66
Features	8.90	9.65	12.80	13.65	9.20	16.65
Grand Total (Performance + Features)	45.32	44.59	50.48	57.09	49.62	65.31
VFM (Index)	17.10	18.97	17.41	19.35	18.38	14.51
Price (Rs)	2,650	2,350	2,900	2,950	2,700	4,500
Grade	B+	B+	B+	A-	B+	B

*Scale of 5



The features offered with the Mercury PS650GXM-L suited its price very well

ic cores: Intel's onboard graphical controller is much better than the S3 core used by VIA and SiS—the image was vibrant, and the texture, true with the Intel Extreme graphics; all these aspects were completely washed out on the S3-based boards.

Conclusion

Gigabyte's GA-8I865GVMK completely dominated the performance arena raking in great scores in all the tests. The only gripe with this board is the lack of an AGP slot. Priced at Rs 5,500, (Rs 600 more than the next-best in terms of performance), this board took the Best Performance title with ease. If you find the price a little too high, your next choice should be the Gigabyte GA-8GEM667, or HIS M53-1A, for their good performance and affordable pricing.

When it comes to the Value for Money award, nothing could beat the Mercury Pi845GLM-L, which performs acceptably, at an amazing price of just Rs 2,625.

MID-

The mid-range category consists of nine motherboards for the Intel platform that are priced between Rs 5,500 and Rs 10,000. Only one motherboard—the ASUS P4S800-MX—was based on the SiS chipset; the other eight are based on Intel's 865 and 845GE chipsets. The 865 chipset is new, and outperforms the ageing 845GE-based motherboards. It was quite clear that the competition would focus between the 865-based chipsets and the lone ASUS SiS 661FX chipset. Both support the latest features, so it's only performance that sets them apart.

Features

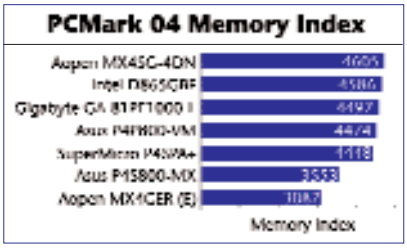
The most important aspect of a motherboard is the features set; this decides how long your motherboard will be of service to you. If you buy a board with the latest features, you have a better chance of still being able to use it two or three years down the line. In the ever-evolving IT industry, things change fast, and you certainly don't want to buy a motherboard that could be obsolete in a year.

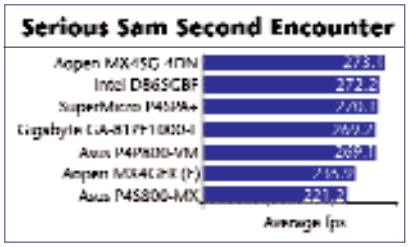
The Intel 865-based motherboards offer the best headroom in terms of features. The upgrade options are numerous, with support for 800 MHz FSB, dual channel DDR 400 MHz memory modules, support for eight USB ports and the onboard native SATA controller, along with the IDE connectors, means you have upgrade options in all the three critical sub-systems-processor, RAM and hard drives. Since the 800 MHz FSB processors are still expensive, you can opt for a 533 MHz FSB processor with Hyperthreading, and upgrade when prices fall. You can do the same for RAM modules and hard disks. The SiS 661FX has all the same features, except for dual-channel memory mode.

The 865PE chipset-based Gigabyte GA-81PE1000-L was the only motherboard in the mid-range category that did not have onboard graphics

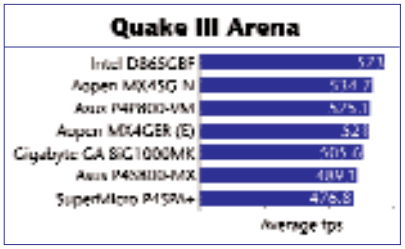
Quite a few boards offered exceptional features. The SuperMicro P4SPA+ and Gigabyte's GA-81PE1000-L offered just about everything you would ever want. Both are built around the Full ATX form factor, and the components are well spaced out, except the oddly-placed power connector in the SuperMicro-the connector is hard to remove once fixed. A close competitor to these two was the Intel 865GBF, but it lost on features due to the omission of an Ethernet controller—the SuperMicro has gigabit Ethernet.

In the Micro ATX form factor segment, the MX4SG-4DN was the better of the two boards from AOpen—the 845 chipset-based AOpen MX4GER only comes with two memory slots. The ASUS P4P800 and Gigabyte GA 8iG1000MK packed everything into a small package and at decent prices. All these boards support 800 MHz FSB, 400 MHz memory frequencies and SATA ports; none came with more than two SATA ports, but for their prices, this isn't disappointing.





The Gigabyte boards were very colourful, and for a purpose—the colour coding makes installation as fool-proof as possible. Most of the 865 boards, except the Intel 865GBF and SuperMicro boards, offer BIOS tweaking for overclocking. Overall, the ASUS P4P800 and the AOpen MX4SG-4DN came out tops, and offer the best features.



Performance

In the gaming benchmarks, the Intel 865GBF motherboard beat the lot with its great performance. It managed to stay ahead of competition in all three gaming tests. The AOpen MX4SG-N and ASUS P4P800 followed, and were good at their job. The ASUS P4S800 motherboard lacked the punch required, and came in last, due to the low-memory bandwidth it has when compared to the 865-based boards.

In the real-world application benchmarks (Ziff Davis Business Winstone, Multimedia Content creation and video encoding), the AOpen MX4SG-4DN edged ahead of its closest competitor, the Gigabyte GA-81PE1000-L, by just 0.32 units. ASUS came in a close third, just 0.42 points behind the AOpen board. The AOpen MX4GER came in last in this test, mainly due to its 845 chipset that was outdone by the rest.

In the synthetic benchmarks, the Intel 865GBF raced ahead again. Coming in a very close second, was the Gigabyte GA-81PE1000-L. The Gigabyte board was just five points behind the Intel board's score of 3,395 in the 3D Mark 2003 test. The AOpen MX4GER sank to the bottom, proving conclusively that an overpriced 845 chipset-based motherboard has no business even competing in this category.

The 865-based boards blew the competition away. The ASUS P4S800, based on the SiS661FX chipset, performed well against the 865, but lost due to its single-channel memory sub-system. The higher bandwidth that the 865s enjoy, due to their dual-channel memory sub-system, spelt disaster for the SiS-based board. What's more, boards based on both chipsets are priced alike, making it unthinkable of buying the SiS661FX-based board. Another unbelievable blunder is the pricing of the 845-based AOpen MX4GER; who would pay Rs 5,000 for a board that performs poorly and has no upgradeability?

Overall, in terms

SCORE BOARD

CATEGORY	MID-RANGE INTEL MOTHERBOARDS				
Brand	AOpen	AOpen	ASUS	Gigabyte	Gigabyte
Model	MX4SG-4DN	MX4SG-N	P4P800-VM	GA 8IG1000MK	GA-81PE1000-L
Chipset	Intel 865	Intel 865	Intel 865	Intel 865G	Intel 865PE
Interface type	Socket 478	Socket 478	Socket 478	Socket 478	Socket 478
FEATURES (25%)					
Maximum CPU supported / FSB supported	P4 3.2 / 800	P4 3.2 / 800	P4 3.2 / 800	P4 3.2 / 800	P4 3.2 / 800
Memory speed (MHz) / Max memory (GB) / Memory slot (nos)	DDR 400 / 4 GB / 4	DDR 400 / 4 GB / 2	DDR 400 / 4 GB / 4	DDR 400 / 4 / 4	DDR 400 / 4 / 2
Form factor	Micro ATX	Micro ATX	Micro ATX	Micro ATX	ATX
AGP slot / Onboard AGP / Type	✔ / ✔ / 8X	✔ / ✔ / 8X	✔ / ✔ / 8X	✔ / ✔ / 8X	✔ / ✘ / 8X
PCI slots	3	3	3	3	5
Onboard sound	✔	✔	✔	✔	✔
Onboard FireWire / Firewire B	✘	✘	✘	✘	✘
USB ports / Rear / Ports via cable	8 / 4 / 4	8 / 6 / 2	8 / 4 / 4	8 / 4 / 4	8 / 4 / 4
Ethernet / Gigabit Ethernet	✔ / ✘	✔ / ✘	✔ / ✘	✔ / ✘	✔ / ✘
SATA Connectors on motherboard / SATA RAID	2 / ✘	2 / ✘	2 / ✘	2 / ✘	2 / ✘
Core voltage / Frequency adjustment	✔ / ✔	✔ / ✔	✔ / ✔	✔ / ✔	✔ / ✔
HyperThreading support	✔	✔	✔	✔	✔
Component layout on the motherboard (S05)*	2.5	3	2.5	2	3
Package contents					
Manual / CDs	✔ / ✔	✔ / ✔	✔ / ✔	✔ / ✔	✔ / ✔
Necessary cables provided	✔	✔	✔	✔	✔
PERFORMANCE (75%)					
Gaming Benchmarks : Serious Sam Second Encounter					
Average fps	273.1	269.7	269.1	268.9	269.2
UT2003 Flyby Demo					
Average fps	337.24	335.75	339.15	335.77	336.86
Quake III Arena					
Average fps	476.4	534.7	525.1	505.6	502
Real World Benchmarks					
Zdbench Content Creation 2004	27.9	27.7	27.6	22.2	27.7
Zdbench Business Winstone 2004	22.7	22.4	22.7	27.8	22.6
Video Encoding (secs)	69	72	72	72	71
Synthetic Benchmarks					
3D Mark 2003 (patch 340)	3,399	3,393	3,396	3,392	3,390
3D Mark 2001 SE	11,873	11,913	11,925	11,920	11,929
PC Mark 2004					
CPU Index	4,894	4,892	4,887	4,819	4,799
Memory Index	4,605	4,468	4,474	4,487	4,497
Graphics	2,791	2,789	2,792	2,842	2,783
Disk Index	2,907	2,908	2,923	2,786	2,908
Total PC Marks	4,905	4,907	4,907	4,898	4,950
Sisoft Sandra 2004 Professional : CPU sub-system					
CPU Dryhstone / Whetstone	9,791 / 4,013	9,472 / 4,003	9,736 / 3,796	9,773 / 4,013	9,812 / 4,023
Multimedia - CPU Integer / FPU SSE	24,539 / 34,285	24,496 / 35,499	24,431 / 34,030	24,546 / 34,503	24,607 / 34,711
Memory sub-system					
ALU / RAM	4,634	4,362	4,380	4,379	4,386
FPU / RAM	4,598	4,381	4,388	4,387	4,402
Disk drive					
Drive Index MB/sec	24,536	24,535	24,517	24,482	26,204
OVERALL SCORE					
Performance	58.14	57.67	57.68	57.38	57.63
Features	18.50	17.80	18.50	18.20	17.80
Grand Total (Performance + Features)	76.64	75.47	76.18	75.58	75.43
VFM (Index)	9.49	11.10	12.09	12.81	10.93
Price (Rs)	8,075	6,800	6,300	5,900	6,900
Grades	B	B+	A-	A-	B+

Scale of 5

ASUS PC-DL Deluxe (Dual Intel Xeon-based motherboard)

The PC-DL Deluxe board from ASUS is the only board based on the Intel 875P chipset for Intel's XEON range of processors. It's targeted at the workstation market, where Intel's Xeon processors are currently the norm.

The board supports two Xeon processors running at 533 MHz FSB. The memory controller can support up to 4 GB of DDR 333 MHz memory in dual-channel mode, along with unbuffered Error Correction Code (ECC). Theoretically, the dual-channel memory implementation provides the board with a peak bandwidth of 4.26 GBps for memory-intensive jobs.

Workstations are widely used in Computer-Aided Design (CAD) and Computer-Aided Manufacturing (CAM) applications. Such high graphic requirements are quenched by adding an 8X AGP Pro slot that can accept any of the latest breed of graphics card.

The latest Southbridge ICH5R from Intel is at work on this board. So, you get native SATA support with RAID-0 and RAID-1 functions without the aid of a third-party controller. As far as I/O is concerned, ASUS has integrated a Promise SATA controller that offers RAID-0, 1 and 0+1 functions through two IDE ATA 133 and two SATA ports. This enables you to build a RAID array of two or four devices.

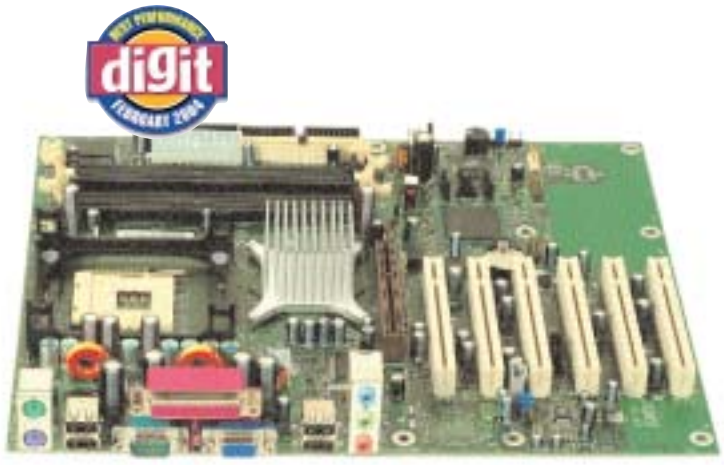
MID-RANGE INTEL MOTHERBOARDS

Intel	SuperMicro	ASUS	AOpen
D865GBF	P4SPA+	P4S800-MX	MX4GER (E)
Intel 865G	Intel 865G	SiS 661FX	Intel 845 GE
Socket 478	Socket 478	Socket 478	Socket 478
P4 3.2 / 800	P4 3.2 / 800	P4 3.2 / 800	P4 3.06 / 533
DDR 400 / 4 / 4	DDR 400 / 4 / 4	DDR 400 / 2 / 2	DDR 333 / 2 / 2
ATX	ATX	Micro ATX	Micro ATX
✔ / ✔ / 8X	✔ / ✔ / 8X	✔ / ✔ / 8X	✔ / ✔ / 4X
6	5	3	3
✔	✔	✔	✔
✘	✘	✘	✘
8 / 4 / 4	8 / 6 / 2	6 / 2 / 4	6 / 4 / 2
✘ / ✘	✘ / ✔	✔ / ✘	✔ / ✘
2 / ✘	2 / ✘	✘ / ✘	✘ / ✘
✘	✔	✔ / ✔	✔ / ✔
✔	✔	✔	✔
2.5	3	2.5	1.5
✔ / ✔	✔ / ✔	✔ / ✔	✔ / ✔
✔	✔	✔	✔
272.2	270.1	221.2	235.9
335.89	335.76	212.9	387.17
573	476.8	489.1	521
28	28.1	26.9	24.9
21.5	21.9	20.9	20.7
70	72	77	91
3,395	3396	3,201	3,393
12,015	11950	10,774	11,428
4,944	4940	4,812	3,716
4,586	4448	3,553	3,087
2,795	2779	2,753	2,752
3,247	3268	3,267	3,370
4,894	4884	4,550	3,716
9,791 / 3,993	9,835 / 3,997	9,367 / 7,126	7,091
24,422 / 35,194	24,445 / 34,260	24,474 / 35,403	17,198
4,610	4368	2,931	2,452
4,609	4374	2,929	2,454
29,200	29,204	35,932	34,149
58.48	57.53	52.65	51.08
14.50	17.80	15.50	11.90
72.98	75.33	68.15	62.98
12.58	7.69	12.39	10.16
5,800	9,800	5,500	6,200
A+	B+	A+	B+

Intel's CSA based Gigabit controller enables you to transfer data at much greater speeds over the network than a normal Ethernet 100base-T controller. The ICH5 offers eight USB 2.0 ports to connect external USB devices for data transfer.

You also get a host of other frills from ASUS—the jack-sensing six-channel audio AD 1985 codec from Analog Devices. This codec senses what's plugged in the sound ports, and notifies you if a wrong connection is made. Tweak the BIOS to overclock the board. Intelligent management of cooling fans results in low noise.

Priced at Rs 18,500, the board offers good value for money, since it's priced much less than other workstation or server-class boards.



The Intel D865GBF walked away with the top honours with its superb all-round performance and decent features, coupled with the legendary stability that Intel offers

Gigabyte's GA-8iG1000MK packs in useful features and a performance that goes well with its terrific pricing. At Rs 5,900, it offers best value like no other motherboard in this range

of performance, the Intel 865GBF performed exceptionally in every test we threw at it. The AOpen MX4SG-4DN also posted some good scores in the set of tests that it was put through and came a close second behind the Intel 865GBF.

Conclusion

The mid-range motherboards for the Intel platform are probably the most important; the boards in this section have the features of a high-end motherboard, but at more affordable prices. So if you are looking at setting up a multi-user PC, with a bare minimum system, with the intention of upgrading later, the best option is an 865-based board.

The Gigabyte GA-8iG1000MK board, with its good performance and equally good feature set, won the Best Value award. Another board you might consider is the P4P800-VM from ASUS, which was equally impressive. On the performance ground, nothing could beat the Intel 865GBF, but remember you can't overclock this board. Enthusiasts should opt for the AOPen MX4SG-4DN, or the Gigabyte GA-81PE1000-L motherboard.

All the top range boards for the Intel platform that made it to this comparison were based on a single chipset—the Intel 875P. This new chipset is built (as Intel claims), for one purpose: to provide the ultimate in performance. We intended to find out exactly that.

Gigabyte and MSI are generous when it comes to handing out, what they consider, must-have goodies—five pairs of SATA cables, two power adapters for a SATA hard disk, an attractive, rounded IDE cable, bundled software, flashing LEDs (which make a modded case look really cool), a six-phase power supply for better stability during over clocking, etc. Intel, on the other hand, offers nothing but the bare essentials such as rquired cables and backplates. Let's dig deep to find out who's the king of the performance hill.

AOpen AX4C Max

Max to the T

The AX4C Max motherboard based on Intel 875P chipset from AOpen, boasts of support for the latest Pentium 4 processors and DDR 400 MHz memory modules. The layout of components is as good as it is bad. The capacitor near the CPU retention mechanism comes in the way of installation, and requires careful handling. The IDE slots, ATX Power connector and memory slots are placed well and aren't cramped. The SATA connectors are lined one after the other, with hardly any space between them-quite irritating if you use more than two connectors.

Though featured packed, it is not in the league of the Gigabyte boards, and offers two Firewire ports, eight USB ports and one Gigabit LAN. Out of the five PCI slots, the one marked in blue can be used for high-power requirement cards such as WiFi, Bluetooth adapters, etc.

The four memory slots can cram in a maximum of 4 GB of memory—provided you buy 1 GB memory modules. The Southbridge provides two SATA ports, the onboard promise controller offers two more ports for RAID 0, RAID 1 and RAID 0+1 modes—it misses out on providing IDE RAID though. The AX4C also has two BIOS chips hardwired on the board, and backup BIOS, in case you blow up the original one. The Watch Dog feature automatically resets the BIOS to default, when the system freezes during overclocking. You can overclock in steps of 1 MHz, which offers excellent control over the process.

The AX4C Max performed brilliantly, but was edged out by the MSI's 875's mind-boggling performance. One area where the board really lost to the MSI, was *Quake III Arena*. In the SiSoft Sandra CPU test, the AX4C level with the MSI board. In other tests, the AX4C was marginally behind the MSI board.

The AX4C is priced at Rs 15,850, acceptable for boards in this category. There's nothing wrong with this board, but there are better ones in terms of performance, features and price; for those who swear by AOpen, it's a good option.

Price: Rs 15,850
+ Stable performance
– Priced too high

AOpen AX4C Max	B-
Performance	
Features	
Build quality	
Value for money	

Gigabyte GA-8KNXP

Loaded to the boot

Gigabyte sure packed its 8KNXP motherboard to the gills. Based on the Intel 875P chipset, the component layout is good—no capacitors come in the way when installing the CPU. The locks on the memory slot don't interfere with the AGP card. The floppy connector is behind the power connector, for easy removal, but the same can't be said for the floppy cable. The IDE connectors are placed quite high up, and this may be inconvenient in case of a small cabinet. The SATA ports are arranged into groups of two, and the IDE RAID ports are placed in the lowermost portion. The Firewire and USB headers are quite awkwardly placed, and the IDE RAID cable comes in the way while connecting respective headers.

The 8KNXP has six memory slots, allowing you maximum flexibility while adding new modules. This board features RealTek's ALC655 sound codec with jack-sensing technology. It also comes with an AGP Pro slot that can take 8x compatible cards. This was the only motherboard to provide both IDE and SATA RAID, with all the three modes of operation—RAID 0, 1 and 0+1. Over-clocking this board is quite simple, with the neat and intuitive BIOS, allowing you to tweak all the necessary parameters in easy steps.

The 8KNXP was only 0.16 units behind the AOpen AX4C, but there was no question of comparing it to the best performer—MSI 875P Neo. The board performed well in most tests, similar to the AOpen board, but couldn't beat the MSI board. Even though it came last in terms of performance, this can't be considered a bad choice because the variation in scores was very small.

At Rs 15,000, the 8KNXP offers great value, considering its packaging. It's not the best performing board, but it's no slouch either. If you like loads of goodies along with your motherboard, apart from reasonably good performance then it has to be this board.

Price: Rs 15,000
+ Great features and package content
– Relatively low on performance

Gigabyte GA-8KNXP	B
Performance	
Features	
Build quality	
Value for money	

Intel 875PBZ

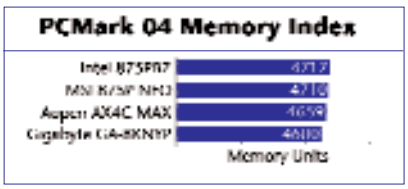
True to tradition

Intel boards are known for their stability, and with the added performance to boot, Intel has stuck another feather in its cap. The 875PBZ performed so well that we had to run the tests twice, just to believe the scores!

The board has its mix of goods and bad—the Northbridge is cooled by a big heat sink, sadly, without any fan or active cooling. The capacitor near the graphics card-locking mechanism is an irritant, especially when removing the card—it leaves hardly any space for accessing the lock. Now for the goods: the SATA ports, IDE connectors and the power connector are ideally placed. All the capacitors are half-sized near the CPU, and don't come in the way when installing the CPU—an extremely good feature.

Features are sparse on this board, as is reflected by the overall score—it is nearly 17 points behind the features winner. There are just two SATA ports, provided via the Southbridge. No extra ports are available courtesy third-party controllers. There's no onboard sound, Firewire capability or IDE RAID capability. Packaging is standard, and there are no frills. As with all Intel boards, overclocking isn't an option.

This board performed brilliantly, and was the only one that could challenge the MSI Neo. In *Quake III Arena*, in normal mode, the scores crossed the 500 fps barrier—only after we switched to a resolution of 1,280 x 1,024 did the score drop below 500 fps. Similarly, in all the other games, it raked high results, making it a good choice for gaming. In the real-world tests and the synthetic benchmarks, the performance was mixed, with the Intel and MSI swapping the laurels.



Priced at Rs 11,440, this is a great board—apart from the rock-solid stability, it also gives you superb performance. The only downside is the overclocking issue, and if you can overlook it, nothing beats this board in terms of price versus performance. This board can make a good, performing and stable gaming machine. Also, you can save the extra money to splurge on a sound card of your choice.

Price: Rs 11,440
+ Great performance, absolute value for money
– Lacks onboard sound

Intel 875PBZ	B+
Performance	
Features	
Build quality	
Value for money	

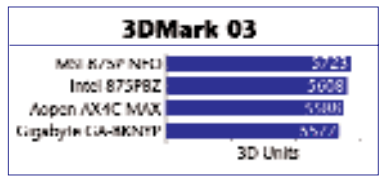
MSI 875P NEO

NEO, the one

The NEO series from MSI has always been exciting—for its packaged contents, plethora of features and of course, the BIOS tweaks for overclocking. And the MSI 875P does not disappoint.

The layout of components isn't as good as the Intel boards—the capacitors near the CPU make installation irritating; the ATX power supply connector also has capacitors that are likely to bend or break when removing the power connector; and the four memory slots are placed too close to each other, so using memory modules with heat sinks can be a problem. The SATA ports are perfectly placed, as is the IDE RAID connector. The AGP slot locks do not interfere with the memory locks-better than the Intel board.

The MSI 875P NEO comes with three colour-coded Firewire headers that can be used via the provided cable. The board does offer RAID capability, but you can attach only two SATA hard drives and one IDE drive—the Gigabyte board allows two each. The actively controlled Northbridge fan has differently coloured LEDs that flash in sequence. The sound system is RealTek's ALC 650 codec, which lacks high-fidelity output. The onboard promise SATA controller provides two more SATA ports, apart from those given by the Southbridge, and supports two modes—RAID 0 and RAID 1. The BIOS is quite intuitive, and the board can be overclocked easily. MSI has provided easy-to-use features in the BIOS, such as Frequency stepping, increasing the FSB and so on, that aid overclocking.



NEO's performance was unbeatable. In the gaming test, it beat the Intel by a slight margin—without overclocking. Only at higher resolutions in *Quake III Arena* did the Intel board beat the MSI convincingly. In the PC mark 04 and 3D Mark 03 tests, which are graphically demanding benchmarks, the MSI beat the Intel. The remaining tests results were even more dramatic, and the variation between them was negligible; the Neo nosed ahead in the end.

Priced at Rs 15,000, the MSI 875P NEO loses out on packaging to the Gigabyte, but edged out the Intel to take the Best Performance crown.

Price: Rs 15,000
+ Superb performance, good features
– Relatively bad layout design

MSI 875P NEO	B
Performance	
Features	
Build quality	
Value for money	

SCORE BOARD

CATEGORY	HIGH-END INTEL MOTHERBOARDS			
	Brand	**Aopen**	**Gigabyte**	**Intel**	**MSI**
	Model	AX4C Max	GA-8KNXP	875PBZ	875P NEO
	Chipset	Intel 875P	Intel 875P	Intel 875P	Intel 875P
FEATURES (40%)	Maximum CPU speed supported (GHz)	3.2	3.2	3.2	3.2
	CPU FSB and Hyperthreading support (MHz)	800 / ✔	800 / ✔	800 / ✔	800 / ✔
	Memory supported (MHz) / Memory slots / Max memory (GB)	DDR 400 / 4 / 4	DDR 400 / 6 / 4	DDR 400 / 4 / 4	DDR 400 / 4 / 4
	Form factor	ATX	ATX	ATX	ATX
	AGP slot / Onboard AGP / Type	✔ / ✘ / 8X	✔ / ✘ / 8x AGP PRO	✔ / ✘ / 8X	✔ / ✘ / 8X
	No of PCI slots	5	5	5	5
	Onboard six-channel audio	✔	✔	No sound	✔
	Onboard FireWire / Firewire-B	✔ / ✘	✔ / ✘	✘ / ✘	✔ / ✘
	No of USB ports / Rear / Ports via cable	8 / 6 / 2	8 / 4 / 4	8 / 6 / 2	8 / 6 / 2
	Ethernet / Gigabit Ethernet	✘ / ✔	✘ / ✔	✘ / ✔	✘ / ✔
	IDE RAID / Type supported RAID 0, 1 , 0+1	✘	✔ / All three modes	✘	✔ / Two modes
	SATA connectors on motherboard / SATA RAID	4 / ✔	4 / ✔	4 / ✔	4 / ✔
	Core voltage / Frequency adjustment	✔ / ✔	✔ / ✔	✘ / ✘	✔ / ✔
	Overclocking and BIOS updating features / software	✔	✔	✘	✔
	Component layout on motherboard (SO5)	2.5	3.5	3.5	3
	Package contents				
	Manual / CDs	✔ / ✔	✔ / ✔	✔ / ✔	✔ / ✔
	IDE, SATA and power cables provided	✔	✔	✔	✔
	Other miscellaneuos components offered	✘	DPS and external SATA bracket	✘	Sound, D-led and Firewire bracket
PERFORMANCE (60%)	**Gaming Benchmarks: Serious Sam Second Encounter (fps)**				
	Average fps	123.72	123.28	136.46	136.34
	UT2003 Flyby (fps)				
	Average fps	199.97	199.97	202.19	202.68
	Quake3 Arena (fps)				
	Average fps	342.27	341.53	408.67	393.90
	Real World benchmarks				
	ZDbench Content Creation 2004	27.7	27.7	28	28
	ZDbench Business Winstone 2004	22.7	22.8	23.3	23.1
	Video encoding (secs)	71	71	69	70
	Synthetic Benchmarks				
	3D Mark 2003 (patch 340)	5,588	5,577	5,608	5,723
	PC Mark 2004				
	CPU index	4,998	4,488	4,900	4,942
	Memory index	4,659	4,600	4,717	4,710
	Graphics	5,287	5,131	5,280	5,317
	Disk Index	0	2,901	2,937	2,932
	Total PC Marks	4,928	5,006	5,086	5,126
	Sisoft Sandra 2004 Professional: CPU sub-system				
	CPU Dhrystone / Whetstone	9,739 / 4,022	9,637 / 4,011	9,215 / 3,637	9,710 / 4,059
	Multimedia - CPU Integer / FPU SSE	24,603 / 35,349	24,586 / 35,691	24,419 / 35,458	24,837 / 35,790
	Memory sub-system				
	ALU / RAM	4,626	4,621	4,870	4,830
	FPU / RAM	4,633	4,622	4,799	4,838
	Disk drive				
	Drive Index MBps	24,232	24,579	24,568	24,544
OVERALL SCORE	Performance	45.19	44.98	45.97	45.99
	Features	27	31.4	13.4	29.4
	Grand Total (Performance + Features)	72.19	76.38	59.42	75.39
	VFM (Index)	4.55	5.09	5.19	5.01
	Price (Rs)	15,850	15,000	11,440	15,000
	Grade	B+	A	A+	A

*Scale of 5

Conclusion

All these boards, which are based on the 875 chipset, performed brilliantly. What differentiates them from the 865s is the performance acceleration technology (PAT), i.e., the optimisation of memory pathway between the CPU and the system memory. This optimisation results in a reduction of latency by about 2 clocks—a gain that is clearly reflected by the scores.

The MSI 875P Neo should make an ideal choice for any enthusiast—it offers the best performance with features that are second only to the Gigabyte. Neo's easy and vast overclocking options add up to give us the best performance winner. The Gigabyte and AOpen boards are equally great, but were completely outshone by the Intel and MSI boards.

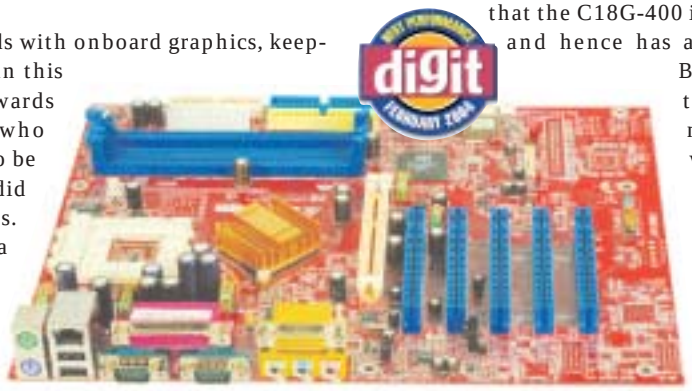
Gigabyte's GA-8KNXP, is loaded to the hilt with equally good BIOS tweaks for overclocking. Intel's 875PBZ on the other hand is a fire cracker at performance, but loses out on BIOS overclocking tweaks. Considering the Intel's outstanding performance, legendary stability and unbeatable price, we had no doubts while awarding it our Best Value award.

Most low-end motherboards for the AMD platform were based on VIA chipsets, ranging from the oldest KM266 to the latest KM400. Surprisingly, two boards based on the nForce2 chipset from Krypton made it to the low-end category due to their extremely low prices.

The boards based on the VIA KM266 chipset lacked many features. The boards did not support newer processors such as the Athlon XP 3200+, and memory standards such as the DDR 400 MHz—all of which reflected in their scores. The KM400 boards were at their best in terms of the features offered.

Performance-wise, the KT400 boards were no different from those based on the KM266, except for one that did manage to give those with the nForce2 chipset a stiff challenge. However, the nForce2 boards were truly unmatched in terms of performance and features.

We tested all low-end boards with onboard graphics, keeping in mind that most boards in this category were targeted towards price-conscious consumers who would expect the said feature to be present. However, two boards did not have integrated graphics. Hence, we tested them using a GeForce4 MX-440 display card. We plugged the same card into the board that topped the onboard graphics crowd. The scores thus obtained were then used to adjudge the winner.



The Krypton NF2400U isn't the most expensive board in this category, but it certainly outperforms the rest

Mercury's KT400FDSX was the lone board with the KT400—the predecessor of VIA's KM400 chipset. Its features are pretty much the same as those of the KM400 boards; the only exception being that it lacks an onboard graphics controller—the graphics needs are catered to by the 8X AGP slot. Also, this ATX motherboard has five PCI slots. However, despite the available extra space, the AGP-slot lock clearly interferes with the memory locks and is badly designed.

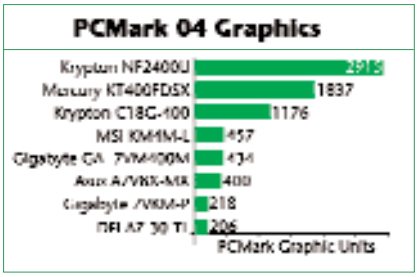
Krypton's C18G-400 and NF2400U, both based on the nForce2 chipset, were complete in terms of available features. Both support CPUs upto Athlon XP 3200+. While NF2400U supports a 400 MHz memory module, the C18G-400 can only handle RAM sticks up to DDR 333. One striking difference is that the C18G-400 is based on the IGP Northbridge, and hence has an integrated video controller. Both boards have an 8X AGP slot thus ensuring that you are not left stranded in case you want to upgrade your graphics sub-system.

While the C18G-400 has just 3 PCI slots, the NF2400U has five. Their layout design is relatively okay, but that of the NF2400U is better between the two. Overall, however, the Krypton C18G-400 walked away with the crown in the features section.

Features

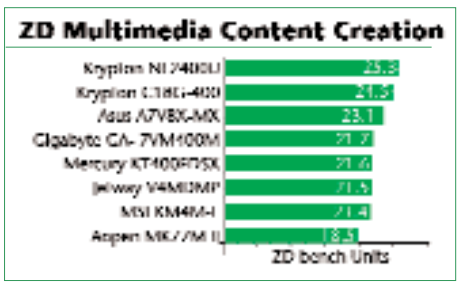
Boards such as the AOpen MK77M II, Gigabyte 7VKM-P and DFI AZ 30-TL based on the VIA KM266 chipset lack quite a number of features. The highest rated CPU they can support is the Athlon XP 2400+, running at 133 FSB. It can handle a maximum of DDR 266 MHz, thus limiting its upgradeability in the long run. They are courteous enough to provide a 4X AGP slot, but you might just not use it since many graphics cards have now migrated to 8X. The presence of six USB 2.0 ports, a LAN connector and onboard sound is quite a relief.

Coming to the KM400 boards such as the ASUS A7V8X-MX, Gigabyte's GA-7VM400M, Jetway's V4MDMP and MSI's KM4M-L, one sees a lot of upgrade options opening up. These boards can be plugged with an Athlon XP 2800+, and support DDR 333 MHz memory modules. However, the layout was cramped, courtesy the micro-ATX form factor. Nevertheless, MSI's KM4M-L and ASUS's A7V8X-MX have a reasonably good design. One aspect that makes them really worth their salt is the presence of the 8X-compliant AGP slots, apart from the integrated graphics. Thus, you have a choice to upgrade to a better graphics card when the need arises. Other features such as 6 USB 2.0 ports, integrated six-channel sound, onboard LAN and overclocking BIOS tweaks are just the norm.



Performance

As mentioned in the beginning, the boards with onboard graphics were compared to arrive at the winner. The winner was none other than the Krypton C18G-400. Not a single VIA chipset board could match up to this board's performance when tested for integrated graphics.



In the real-world tests, comprising the ZD Bench suite and the video-encoding test, the Krypton C18G-400 was way ahead of the competition. The only board that came close to its performance was the ASUS A7V8X-MX. The AOpen, DFI and Gigabyte's contenders could hardly stand up to the C18G-400's performance. The prime reason for such a difference was the memory sub-system.

While the nForce2 chipset-based C18G-400 relies on a better and faster memory standard, the other three still use older and slower memory standards, resulting in a performance drop even in applications used on a daily basis. This clearly indicates that the KM266 chipset is outdated—don't even consider using it for an office PC. On the other hand, the KM400 boards hovered around the 80 per cent mark but could not surpass the Krypton. Nevertheless, they still are in the race as shown by the ASUS A7V8X-MX board.

SCORE BOARD

CATEGORY	LOW-END AMD MOTHERBOARDS					
Brand	**AOpen**	**DFI**	**ASUS**	**Gigabyte**	**Gigabyte**	**Jetway**
Model	MK77M II	AZ 30-TL	A7V8X-MX	7VKM-P	GA- 7VM400M	V4MDMP
Chipset	VIA KM266	VIA KM266	VIA KM400	VIA KT400	VIA KM400	VIA KM400
Interface type	Socket A	Socket A	Socket A	Socket A	Socket A	Socket A
FEATURES (30%)						
Maximum CPU supported	Athlon XP 2400+	Athlon XP 2400+	Athlon XP 2800+	Athlon XP 2400+	Athlon XP 2800+	Athlon XP 2800+
Memory speed (MHz) / Max memory (GB) / Memory slots	266 / 2 / 2	266 / 2 / 2	333 / 2 / 2	266 / 2 / 2	333 / 2 / 2	333 / 2 / 2
Form factor	Mini ATX	Mini ATX	Mini ATX	Mini ATX	Mini ATX	MiniATX
AGP port/ Onboard AGP / Type	✔ / ✔ / 4X	✔ / ✔ / 4X	✔ / ✔ / 8X	✔ / ✔ / 4X	✔ / ✔ / 8X	✔ / ✔ / 8X
PCI slots	3	3	3	3	3	3
Onboard sound / Bulit in APU	✔ / ✘	✔ / ✘	✔ / ✘	✔ / ✘	✔ / ✘	✔ / ✘
USB ports / Rear / Ports via cable	6 / 2 / 4	6 / 2 / 4	6 / 4 / 2	6 / 2 / 4	6 / 2 / 4	6 / 2 / 4
Ethernet	✔	✔	✔	✔	✔	✔
Overclocking and BIOS updating features / softwares	✔	✔	✔	✔	✔	✔
Core voltage adjustment	✔	✘	✔	✔	✔	✔
Freq adjustment	✔	✘	✔	✔	✔	✔
Component layout on the motherboard (SO5)**	2.17	2.00	2.67	2.17	2.33	1.17
Package contents						
Manual / CDs	✔/✔	✔/✔	✔/✔	✔/✔	✔/✔	✔/✔
Necessary cables provided	✔	✔	✔	✔	✔	✔
PERFORMANCE (70%)						
Gaming Benchmarks: Serious Sam Second Encounter						
Average fps	20.83	17.80	24.70	16.13	Failed	27.63
Quake III Arena						
Average fps	26.53	24.53	39.17	26.60	38.23	35.43
Real world Test						
ZDbench Content Creation 2004	18.5	17.8	23.1	18.5	21.7	21.5
ZDbench Business Winstone 2004	14.6	13.6	21.8	14.3	19.3	20.2
Video Encoding (Time in secs)	125	133	89	118	88	91
Synthetic Benchmarks						
3D Mark 2001 SE (patched- for onboard without AGP slot)	569	522	1,367	624	1,426	1,403
PC Mark 2004						
CPU Index	3,072	1,295	2,024	3,111	2,056	3,388
Memory Index	1,336	3,495	3,382	1,521	2,971	1,962
Graphics	218	2,997	3,406	218	3,441	400
Disk Index	3,483	206	400	2,943	434	2,967
Total Score	2,168	2,070	2,560	2,210	2,715	2,555
Sisoft Sandra 2004 Professional: CPU sub-system						
CPU Dhrystone / Whetstone	7,597 / 3,134	7,582 / 3,128	7,831 / 3,239	7,654 / 3,166	7,873 / 3,257	7,753 / 3,250
Multimedia - CPU Integer / FPU SSE	18,206 / 18,652	18,188 / 18,722	18,847 / 19,342	18,392 / 18,941	18,922 / 19,457	18,933 / 19,486
Memory sub-system						
ALU / RAM	884	871	2,040	1,191	1,998	1,665
FPU / RAM	870	853	1,948	1,147	1,901	1,668
Disk drive						
Drive Index MBps	26,225	26,355	25,655	19,716	19,110	20,700
OVERALL SCORE						
Performance	33.40	32.03	43.99	33.55	41.10	41.81
Features	11.37	10.30	14.07	11.37	13.93	13.47
Performance + Features	44.77	42.33	58.06	44.92	55.04	55.28
VFM	11.19	9.41	13.50	14.49	12.23	16.50
Price (Rs)	4,000	4,500	4,300	3,100	4,500	3,350
Grade	C+	C	B	B	C+	B

***Scale of 5*

In the synthetic tests, the results were similar. The PCMark 2004 test results clearly shows it all. As expected, the memory scores for boards with the KM266 chipset were the lowest. In second place were the KM400 boards, while the nForce2 boards won the top spot.

Similarly, in 3DMark 2001 SE, the graphics scores were really low for the KM266 boards. They got better to a certain extent on the KM400 boards, and then shot up for the nForce2 Krypton board. This clearly made the Krypton C18G-400 a winner in this bunch of motherboards.

For a mere Rs 2,850, you get the impressive Mercury KT400FDSX—graphics card extra, of course

We then compared the Krypton C18G-400 with the other two boards—the Mercury KT400FDSX and the Krypton NF2400U. The graphics score was the only parameter that was calculated with the insertion of the graphics card. Let's have a quick look at what turned up.

In *Serious Sam 2*, it was the Krypton NF2400U that was ahead of the two boards.

LOW-END AMD MOTHERBOARDS

MSI	Mercury	Krypton	Krypton
KM4M-L	KT400FDSX	C18G-400	NF2400U
VIA KM400	VIA KT400	Nforce2	Nforce2
Socket A	Socket A	Socket A	Socket A
Athlon XP 2800+	Athlon XP 2800+	Athlon XP 3200+	Athlon XP 3200+
333 / 2 / 2	333 / 3 / 3	333 / 2 / 3	333 / 3 / 3
Mini ATX	ATX	Mini-ATX	ATX
✔ / ✔ / 8X	✔ / No / 8X	✔ / ✔ / 8X	✔ / No / 8X
3	5	3	5
✔ / ✘	✔ / ✘	✔ / ✘	✔ / ✘
6 / 4 / 2	6 / 4 /2	6 / 2 / 4	6 / 2 / 4
✔	✔	✔	✔
✔	✔	✔	✔
✔	✔	✔	✔
✔	✔	✔	✔
3.00	2.50	2.17	2.50
✔/ ✔	✔/ ✔	On CD-ROM	On CD-ROM
✔	✔	✔	✔
29.27	107.70 *	83.23 *	119.70 *
38.87	227.67 *	245.67*	196.12 *
21.4	21.6	24.5	25.3
20.2	21.3	22.9	24.3
91	88	78	74
1,428	7,092 *	4,796 (6,308*)	6,500 *
1,946	3,362	2,410	2,631
2,933	2,075	2,961	2,948
3,387	1,837	3,656	3,761
457	2,915	1,176	2,915
2,591	3,352	3,457	3,904
7,858 / 3,246	7,823 / 3,246	8,347 / 3,439	8,321 / 3,442
18,862 / 19,294	18,885 / 19,429	20,033 / 20,583	20,017 / 20,567
1,883	2,125	2,330	2,832
1,806	2,039	2,191	2,658
19,049	20,151	26,215	26,265
41.89	57.15	59.14	63.28
14.20	13.00	14.87	14.80
56.09	70.15	74.01	78.08
14.02	24.62	17.01	20.02
4,000	2,850	4,350	3,900
B+	A	B	B+

** Were obtained by using a Geforce4 MX-440 AGP 8X Display card*

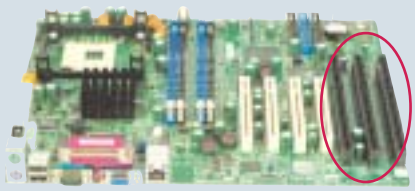
Mercury's KT400FDSX and Krypton C18G-400 clawed at each other, returning nearly equal scores. In *Quake III Arena*, the C18G-400 took a good lead, leaving both the boards behind. In the 3D Mark2001 SE test, it was Mercury's turn to outshine the others by logging the best scores for a board in this category. Overall, it was Mercury's KT400FDSX that got the better of these two Krypton boards in the gaming arena by a very small margin.

In the real-world tests, it was no surprise that the Krypton motherboards outdid the Mercury's KT400FDSX by a significant margin. In the synthetic tests, especially the PCMark 2004 test, Krypton's NF2400U came out tops, beating both the boards with an outstanding performance.

Boards With a Purpose

Along with the usual breed of desktop boards, we also got two boards—P4SCA and P4SSA—that were targeted at niche markets. Both these boards were sent to us by SuperMicro. The P4SCA is based on Intel's 875P desktop chipset, while the P4SSA model is based on Intel's E7205 workstation chipset.

The P4SCA is targeted as a desktop chipset, but was not part of the comparison as it lacks an AGP slot. Since the integrated RageXL display adapter is quite old, we decided not to run our graphic benchmarks on this board.



For Rs 16,000, you get backward compatibility for ISA components with an Intel 875P chipset

The USP of this board is the presence of three ISA (Industry Standard Architecture) slots—the long black slots that were seen on motherboards of the 486 and Pentium era. Apparently, this is the only board in the market to integrate ISA slots on Intel's latest flagship chipset-875P. The presence of ISA slot is strange, since nearly all expansion cards today are PCI based. When we asked why this was so, we were informed that the ISA standard is still prevalent in the telecom sector. So the P4SCA is targeted at customers that require legacy compatibility with the latest technology. Apart from the missing 8x AGP slot, this board offers all other Intel 875P features—dual-channel memory, Gigabit Ethernet, eight USB ports, etc. The board performed as well as the other 875-based boards—except for the sore graphics. Priced at Rs, 16,900, it's expensive by desktop standards, but could be indispensable for the telecom sector.

The P4SSA is a workstation board, but by today's desktop standards it is outdated. It has support for 533 FSB processors, DDR 266 memory modules in dual-channel with ECC, Gigabit Ethernet, six USB 2.0 ports, AGP 8X slots, etc. All these features have been superseded by desktop boards based on 875 chipset. Hence, we recommend that you buy a board based on later chipset models. We found that it offers a decent performance—somewhere between the Intel 845 and Intel 865 chipset boards. Priced at Rs 12,800, this board is too expensive. Opt for an Intel 875PBZ motherboard instead.

Conclusion

As for the boards based on the KM266 chipset, this is the end of the world and they can take it no longer. Coming to the nForce2-based boards, things get a bit complex. With good performance, the Krypton C18G-400 offers a better price-to-performance ratio as compared to the similarly priced KM400-based ASUS A7V8X-MX, which was the next best among the onboard graphic boards. Hence, if you don't mind running your PC using onboard graphics, but do wish to keep that upgrade option around for the future, then nothing beats the Krypton C18G-400.

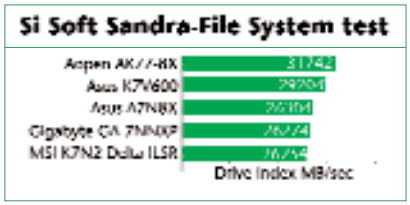
However, if you are ready to shell out a few extra bucks needed for a graphics card, then the best board to pair it with is the Krypton NF2400U—courtesy its superb performance. At Rs 2,850, the value for money that Mercury's KT400FDSX provides simply can't be beaten; the lack of an onboard graphics controller notwithstanding.

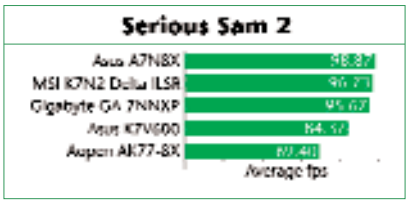
The mid-range category for the AMD platform comprised five boards from four vendors. Out of these, three were based on nVidia's nForce2 chipset, and the other two were based on VIA's relatively new KT600 and the older KT400 chipset. Prices began from as low as Rs 5,700, depending on features and package contents, moved upwards. We also received a limited edition board from Gigabyte, priced at Rs 13,000, which, according to our categorisation based on price, should fit in the high-end category, but taking into account it's features and performance, we compared it with boards in the mid-range category.

The board based on VIA's new KT600 was the first board based on this chipset we reviewed. We were eager to see this updated chipset take on nVidia's powerhouse chipset. Besides, the board came from ASUS, adding to our expectation of it emerging the winner. But in the end, the fight was between nVidia's nForce2 and VIA's KT600.

Features

Boards based on the nForce2 were rich in features, and comparable to Intel's mid-range section. They support a CPU running at 200 MHz FSB, which means you can plug in an Athlon XP 3200+, currently the fastest available 32-bit processor from AMD. All these boards have support for DDR400 memory, and they run in dual-channel mode, thus spelling higher bandwidth for memory-intensive applications. With the exception of the Gigabyte GA-7NNXP Limited Edition board—which has four memory slots—all the others had three slots. The ASUS A7V600 supports a 200 MHz FSB CPU and DDR 400 memory, and the AOpen AK77-8X, based on the KT400, supports a CPU at 166 MHz FSB—for example, the Athlon XP 2800+—and DDR 333 MHz memory. Unofficially, though, it supports DDR400.





All the boards were based on the ATX form factor, and only MSI did a great job of the available real estate. The CPU area didn't have any obstructive capacitors, so you can plug on a bigger heat sink-fan combo with ease. The same went for the ASUS A7N8X. The extra dual-power supply daughter card slot on the Gigabyte board made it a little difficult for clipping on a bigger heat sink. The VIA-based boards were average in their design approach.

The boards from ASUS, Gigabyte and MSI, based on the nForce2, have the feature-rich MCP-T Southbridge, so there were Firewire ports and the audio processing unit on these boards. There was, however, no sign of the newer Firewire 1394B standard. The AOpen and ASUS boards, based on VIA chipsets, lacked these features entirely. The Ultra versions of the nForce2 chipset support dual LAN; only ASUS' A7N8X and Gigabyte's 8KNNXP boards were equipped with it, and offered both, Gigabit and Ethernet connectors. The MSI

The Gigabyte GA-7NNXP is a special edition board that's literally bursting with all the features you'd ever need

Memo...Rising

The GHz value of a processor has always being used as a yardstick to determine a PC's performance. Similarly, the speed of system memory is another parameter that can be used to define computing power. These two parameters are inter-linked, and hence depend upon each other to achieve the optimum computing speed. System memory, or RAM, has come a long way from the days of the slower EDO type, to today's blazing fast DDR standard and now the Dual channel implementation. But why did the shift happen in the first place?

Not so long ago, when processor speeds were still in the MHz, SDRAM—the de-facto standard then—ran at 133 MHz. But as processor speeds crossed 1 GHz, the RAM couldn't keep up with the processor's ability to processes data and hence became a bottleneck for system performance. The problem was checked with the arrival of the DDR standard, which currently offers a speed of 400 MHz and above. Even such speeds do not offer the ideal throughput between memory and CPU. So, Intel decided to bring in dual-channel memory—extensively used in servers and workstation systems, to desktop systems.

To understand the difference between dual-channel and single channel memory, think of dual-channel memory as a two lane road, while single channel memory is a single lane road. The traffic (data) on the two-lane road is handled more efficiently than on a single lane road, since it offers more width and two separate parallel paths for seamless motion. Similarly, dual-channel memory offers a wider data path (128-bit as against 64-bit for single channel memory), and two clear channels. Like traffic signals at junctions, the memory controller on the Northbridge (chipset) acts as a regulator, controlling the data transfer between CPU and memory. A single channel can be made to address a pair of memory modules, thus with two channels, you have four memory modules.

Memory performance is given in terms of Peak Data Bandwidth, which is the measure of throughput that the memory can handle. It can be calculated as:

Memory speed x Number of bytes transferred per channel x Number of channels.

For PC3200 (DDR 400 in dual-channel implementation) RAM

Peak Bandwidth = 400 MHz x 8 Bytes x 2 channels

= 6,400 MBps

= 6.4 GBps as compared to 3.2 GBps for a single channel implementation of the same memory.

Thus, dual channel memory doubles the maximum amount of data that can be transferred between the CPU and the system memory modules.

was the only board with just onboard Ethernet. Both the VIA-based boards came with Gigabit LAN—Gigabit LANs provide a pipeline 10 times larger for data transfers over a regular 100 base-T, and so can be very useful in offices where large files are transferred over the LAN, such as game development studios, architectural firms, etc. ASUS' A7N8X also had a proprietary Wi-Fi slot ready for plugging in the ASUS Wi-Fi kit.

Coming to I/O, the Gigabyte motherboard offers the maximum flexibility, with support for IDE RAID in all three modes—0, 1 and 0+1. The board also features SATA RAID for use in the future. Next in line was the board from MSI, with both IDE and SATA RAID, but with just two modes. The ASUS A7N8X doesn't support IDE RAID, but you do get SATA RAID. The ASUS A7V600 supports SATA ports, as opposed to the AOpen, which lacks this feature.

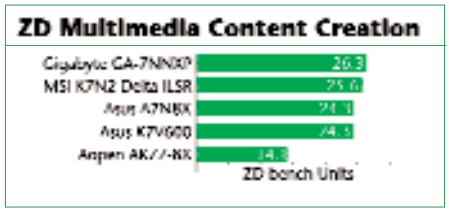
The ASUS A7N8X-Del out-did the competition, on both features and performance, to claim the Best Performance award

Package contents never get better than Gigabyte's generous offerings. You get a dual power supply daughter card, an external SATA adapter, brackets for Firewire, USB and sound, and loads of cables. ASUS and MSI were at their usual best, offering all that was needed to get their boards up and running. The ASUS A7V600 and the AOpen AK77-8X were meagrely bundled compared to the Gigabyte package.

Performance

The race for the performance crown was a close and exciting one, with the Gigabyte and MSI boards in a deadlock with the ASUS A7N8X, the pack leader, in most tests.

In the *Serious Sam 2* benchmark, ASUS' A7N8X emerged the clear winner, leaving the closest competitor behind by 9 fps, which is fairly good margin. The MSI and Gigabyte boards were quite in the same league, with the latter lagging by just a frame. Only at higher resolutions did the MSI board manage to come on par with the ASUS A7N8X-Del. The ASUS A7V600 was left way back in the test at lower resolutions, but did manage to pull up to the competition at higher resolutions. However, the KT400-based AOpen board was simply unable to match the other boards, and it's clear that this chipset is ageing.



In the *UT 2003* benchmark, the ASUS A7N8X-Del again showed its dominance by packing in good frame rates. The competition wasn't far behind, and the Gigabyte GA-7NNXP was quite on par with the ASUS board. Following closely was MSI's K7N2 Delta. As we moved towards higher resolutions, the differences in scores reduced, and at 1600 x 1200, the Gigabyte was on par with the ASUS A7N8X. The ASUS A7V600 showed the same results - at lower resolutions, it could hardly match the nForce2-based boards, and at higher resolutions it did manage to get on par with them.

With *Quake III Arena*, the picture was completely different. MSI's K7N2 Delta took a good lead of 70 fps—around 16 per cent—from the second-best ASUS A7N8X, but the lead disappeared as the resolution scaled up. Finally, it was again ASUS and Gigabyte, respectively, taking the top slots. This time, the VIA chipset-based boards were way behind the nForce2-based boards.

At a terrific price of just Rs 6,100, the ASUS A7V600 bags the Best Value award by offering great features and decent performance

Overall, in the gaming arena, ASUS A7N8X beat the others by a small margin. MSI was next-best in terms of overall game performance, beating the Gigabyte by just 0.2 units. The A7V600 from ASUS, based on the KT600, was equally good in the gaming performance tests. This board will

Contact Details

Brand	Intel	Jetway	Krypton	Mercury	MSI	SuperMicro
Company	SES TECHLimited	Anirox Technologies ltd	Priya Ltd	Kobian India Ltd	Cyberstar Infocom Ltd	Netweb Technologies
Tel no	022-26824141	022-28655282/83	022-56663100	080-5566624	080-2276986	011-26453486/26293486
Fax	022-26824581	NA	022-56663199	080-5566625	080-2236781	011-26483586
E-mail	kp@sesindia.com	aniroxby.vinay@anirox.com	priyabom@priya-group.com	india@kobian.com	narend@cyberstarin.net	sales@netwebindia.com
Web site	www.intel.com	www.jetway.com	www.priyagroup.com	www.kobian.com	www.msi.com.tw	www.supermicro.com

Brand	AOpen	ASUS	DFI	Gigabyte	HIS/Maxforce	ASRock	
Company	Xserve India Pvt Ltd	ASUSTek Computer	Zeta Technologies	Digi Giga Sytems Ltd	Maxtone Electronics	Tirupati Enterprises	Abacus Peripherals P. Ltd
Tel no	080-5572601	022-56926013	022-24102288	022-26526696	022-23016469	033-22423861	022-56923941
Fax	080-5572603	NA	022-24102277	022-56902210	022-23088545	033-25543255	022-56923946
E-mail	info@xserves.com	info_india@asus.com.tw	sales@zetaindia.com	sales@dlink.co.in	meplsales@maxtone.com	asrock@tirupati.net	sandeep@abacus-peripherals.com
Web site	www.aopen.com	www.asus.com	www.dfi.com.tw	www.gigabyte.com.tw	www.hightech.com.hk	www.asrock.com	www.asrock.com

CATEGORY	MID-RANGE AMD MOTHERBOARDS				
Brand	ASUS	MSI	ASUS	AOpen	Gigabyte
Model	A7N8X	K7N2 Delta FISR	A7V600	AK77-8X	GA-7NNXP
Chipset	Nforce2 400-Ultra	Nforce2 400-ultra	VIA KT600	VIA KT400	Nforce2 400-Ultra
Interface type	Socket A	Socket A	Socket A	Socket A	Socket A
FEATURES (30%)					
Maximum CPU supported	Athlon 3200+	Athlon 3200+	Athlon 3200+	Athlon 2800+	Athlon 3200+
Memory speed (MHz) / Max memory (GB) / Memory slots	400 / 3 / 3	400 /3/ 3	400 /NA/ 3	333/ 4 /4	400 / 3/ 4
Form factor	ATX	ATX	ATX	ATX	ATX
AGP port / Onboard AGP / Type	✔ / ✘ / 8X	✔ / ✘ / 8X	✔ / ✘ / 8X	✔ / ✔ / 8X	✔ / ✘ / 8X-Pro
PCI slots	5	5	6	5	5
Onboard Sound / Bulit in APU	✔ / ✔	✔ / ✔	✔ / ✘	✔ / ✘	✔ / ✔
Onboard FireWire / Firewire-B	✔ / ✘	✔ / ✘	✘	✘	✔ / ✘
USB ports / Rear / Ports via cable	6/4/2	6/4/2	8/4/4	8/4/4	8/4/4
Ethernet / Gigabit Ethernet	✔ / ✔	✔ / ✘	✘ / ✔	✘ / ✔	✔ / ✔
RAID 0, 1 , 0+1	RAID 0, 1	RAID 0, 1	✘	✘	RAID 0, 1, 0+1
SATA / SATA RAID	✔ / ✔	✔ / ✔	✔ / ✘	✘ / ✘	✔ / ✔
Overclocking and BIOS updating features / software	✔	✔	✔	✘	✔
Core voltage adjustment	✔	✔	✔	✔	✔
Freq adjustment	✔	✔	✔	✔	✔
Component layout on the motherboard (S05)*	3.17	3.67	2.50	3.00	3.00
Package contents					
Manual / CDs	✔ / ✔	✔ / ✔	✔ / ✔	✔ / ✔	✔ / ✔
Necessary cables provided	✔	✔	✔	✔	✔
PERFORMANCE (70%)					
Gaming Benchmarks: Serious Sam Second Encounter					
Average fps	98.87	96.73	84.37	69.40	95.67
UT2003					
Average fps	111.78	111.23	110.79	117.16	111.64
Quake III Arena					
Average fps	203.57	191.67	155.33	135.67	190.00
Real world Benchmarks					
ZDbench Content Creation 2004	24.3	25.6	24.3	14.1	26.3
ZDbench Business Winstone 2004	26.1	24	22.7	20.3	24.3
Video encoding (Time in secs)	73	75	75	93	72
Synthetic Benchmarks					
3D Mark 2003 (patch 340)	3,362	3,341	3,311	3,022	3,367
3D Mark 2001 SE (patched- for onboard without AGP slot)	11,855	11,642	11,470	10,272	11,659
PC Mark 2004					
Memory Index	2,751	2,624	3,704	3,391	2,793
Disk Index	2,911	2,901	2,390	2,049	2,881
CPU Index	3,768	3,745	2,843	2,913	3,757
Graphics	2,860	2,899	3,314	3,350	2,984
Total Score	3,959	3,926	3,822	3,437	3,957
Sisoft Sandra 2004 Professional: CPU sub-system					
CPU Dhrystone / Whetstone	8,341 / 3,437	8,297 / 3,428	8,349 / 3,444	7,894 / 3,256	8,293 / 3,446
Multimedia - CPU Integer / FPU SSE	20,027 / 20,571	19,965 / 20,515	20,010 / 20,529	18,915 / 19,419	20,062 / 20,606
Memory sub-system					
ALU / RAM	3,043	2,818	2,701	2,121	3,047
FPU / RAM	2,860	2,645	2,516	2,006	2,864
Disk drive					
Drive Index MBps	26,304	26,254	29,204	31,742	26,274
OVERALL SCORE					
Performance	58.50	57.35	54.89	46.52	58.24
Features	20.27	19.47	17.50	15.20	21.70
Grand Total (Performance + Features)	78.77	76.82	72.39	61.72	79.94
VFM	9.00	8.54	11.87	10.83	6.15
Price	8,750	9,000	6,100	5,700	13,000
Grades	B	B	A	A-	B+

** Scale of 5*

allow gameplay on par with the nForce2-based boards, especially at higher resolutions.

In the real-world test, the competition was cut-throat, with the Gigabyte 7NNXP beating ASUS by a hair's breadth. MSI's K7N2 Delta was also in the league, falling short by a few paces, and coming in at third spot. The ASUS A7V600, too, put up a commendable performance. The AOpen board, straddled with the KT400 chipset, was badly hit in the real-world test, and its scores were low. This can be attributed to the underpowered memory subsystem of the KT400 chipset, which runs in single-channel. The nForce2 has dual-channel memory architecture, whereas the new VIA KT600 uses a different approach towards bettering the memory implementation. The results are visible—the KT600-based board performed about as well as the nForce2-based boards in the real-world test.

In the synthetic tests, especially the I/O test, the VIA Southbridge extracts the maximum out of your hard disk, and is therefore a clear winner in terms of I/O. So, if your work involves

Decision Maker

	Price-conscious	Prudents	Enthusiasts
You need	A reasonably good motherboard that offers integrated video and audio for now, has some upgradeability options for the future	A motherboard that supports the latest and future hardware, offers reasonably good features, performs brilliantly and does not cost a bomb	The latest and the best of them all, loaded to the hilt with features, delivers performance that goes through the roof and you care a hoot about the price
Look for	A motherboard based on Intel 845-GL or 865G chipset for Intel platform, and KM400 or nForce2 chipset based board for AMD platform	A motherboard based on the Intel 865G chipet for Intel platform and nForce2-400 Ultra chipset-based boards for the AMD platform	A motherboard based around Intel's 875P chipset for Intel. For AMD, the Deluxe models based on nForce2-400 Ultra chipset
Our pick	Gigabyte GA-8I865GVMK, Mercury Pi845GLM-L, Krypton NF2400U and Mercury KT400FDSX	Intel-D865GBF, Gigabyte GA-8iG1000MK, ASUS A7N8X-Del and ASUS A7V600	MSI 875P Neo, Intel 875PBZ, ASUS A7N8X-Del, Gigabyte 7NNXP and MSI K7N2 Delta-ILSR
Price	Up to Rs 5,500	Up to Rs 10,000	Above Rs 10,000

heavy I/O transfers, the ASUS A7V600, with its better I/O sub-system, makes a good choice. Also, the SATA controller is native to the VIA's KT600 Southbridge, as opposed to the third-party controllers provided on the nForce2 boards.

Conclusion

Overall, the ASUS A7N8X-Del (Deluxe) is still the performance champion, coming out tops in every test we conducted. The Gigabyte's 7NNXP very nearly beat it, with better performance in the real-world tests, but it fell short by 0.3 units overall. The price tag on the Gigabyte, however, is not justified: even if it performs on par with the best, and has a couple of features more than the ASUS A7N8X, the extra Rs 5,000 is too much to ask—anything around Rs 10,000 would make this board worth buying. The MSI K7N2 Delta did everything right, but was beaten by a better performer. The ASUS A7V600 was the underdog that proved its worth by pulling itself on par with the champions on most of the tests, and beating the pants off them in the I/O tests. Considering the features offered, and the performance it delivers, it's our Best Value winner in the mid-range category.

SANKET NAIK
sanket_naik@thinkdigit.com

Memory Gallops

Here's how seven brands of memory hit the turf to race against each other

For most computer buyers, all that concerns the RAM is how much of it there is. Most people do not know the brand, or the role it plays in the system. But once applications start loading slowly, games start freezing and the machine generally begins like a dimwit, the first thing that comes to mind is an upgrade. And the friendly neighbourhood computer*wallah* blames it all on the RAM. Thanks to these memory modules, you can load applications faster, play games smoothly and access data quickly. To shed more light on the mystical nature of the RAM, we concluded the first-of-its-kind RAM shootout.

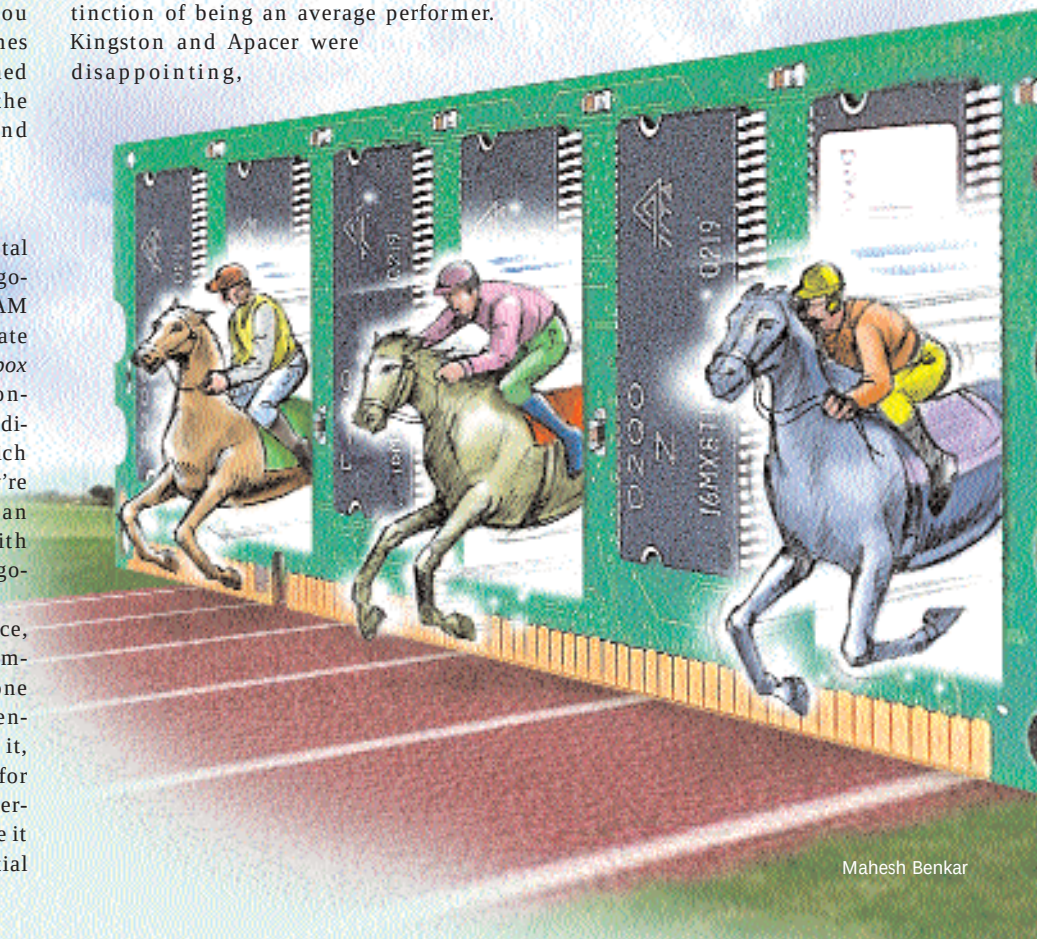
Analysis

We had two categories—the horizontal and the vertical. In the horizontal category, we tested the different brands of RAM available, at the same data rate (333 MHz), while the CAS latency *(See box below: 'CAS Latency')* was kept at a constant 2.5 ns. The vertical tests were dedicated to modules with Hynix chips, which we tested for all the data rates that they're currently available in. This gave an overview of the performance gain, with increase in data rate, in the same category of chip.

We received two high performance, DDR 400 Twinx XMS Low Latency memory modules from Corsair. We clocked one of them, at 333 MHz with the CAS latency kept at 2.5ns. We ran our tests on it, and the results were used as reference for the other modules. We used the underclocked Corsair as the reference because it indicates the maximum potential throughput of the DDR333 standard.

In the horizontal tests, in spite of the close competition, the Transcend module gave the best performance. Transcend uses PSC memory chips on its modules, which showed its mettle in the PC Mark, Adobe Photoshop and Content Creation tests. The Kingston and Apacer were the next best in terms of performance. We were surprised by the Hynix module, which scored well—Hynix has the dubious distinction of being an average performer. Kingston and Apacer were disappointing, because of their higher-than-Hynix prices. The highest priced module was the Apacer, which uses Infineon memory chips. It stood third in the performance tests.

Pricing certainly affects these brands, since DDR 333 is catching up in the market. Unless prices are brought down, manufacturers like Kingston and Apacer can't hope to make a dent in a RAM market that's dominated by Hynix.



Mahesh Benkar

CAS Latency

The RAM module is an organised collection of integrated chips (ICs). Each module is controlled by the memory controller, which handles the signals going from the CPU to the RAM. There are two signals—the Row Access Strobe (RAS) and the Column Access Strobe (CAS). Each memory chip is divided into rows and columns, making it look like a cell matrix. Each cell has a row address and a column address. When the CPU sends a signal to the memory controller, it first accesses the row by putting an address on the memory's address pins, and activating the RAS signal. Then it waits a few clock cycles—this is the RAS-to-CAS Delay. It then puts the column address on the address pins, and activates the CAS signal. Then there's a wait for another few clock cycles, which is the CAS delay. Finally, the data appears on the pins of the RAM.

The CAS delay is called CAS Latency. Lower CAS latency provides faster data access. CAS-2 is where the CPU waits for 2 clock cycles; CAS-3 is where it waits for 3 clock cycles, and so on. However, CAS-2 affords a performance gain over CAS-3 only when you play games or overclock your CPU. The CAS latency is usually 2.5 for DDR RAM.

How We Tested

Our test bed was an Intel D875PBZ motherboard running an Intel 3.2 GHz processor. This could test the RAM modules at all clock speeds, from 266 to 400 MHz. A 40 GB Seagate Barracuda hard drive, a GeForce4 TI 4600 and the SoundBlaster Audigy2 were the other components.

We tested only Double Data Rate Synchronous Dynamic Random Access Memory (DDR SDRAM), since all motherboards available now support it, irrespective of clock frequency. Older SDRAM, though still available in the market, is slowly being phased out. The same goes for the RAMBUS technology that Intel bandied about for some time before going the DDR way. We carried out five tests—three real-world tests, and two synthetic ones.

We used SiSoft Sandra, PC Mark 2004, Adobe Photoshop, Content Creation and *UT 2003* for our tests. SiSoft Sandra is a synthetic test that emulates read and write on the RAM, and gives integer and floating point scores. It doesn't actually transfer any data on or off the RAM. PCMark 2004, however, does just that, and gives a single, unified score.

The Content Creation test is a system-level benchmark, and was used to obtain scores for configurations of the same system with the RAM being the only variable. The *UT 2003* benchmark was used to gauge the gaming performance difference amongst the different data rates of the RAM, in the vertical category.

The value for money offered by Hynix is unmatched by the other manufacturers—it's the lowest priced module in the lot, and gives good performance, making it our value winner. Hynix also happens to be the most widely available in the market.

In the vertical tests we conducted on the Hynix modules, the performance plotted against increasing clock speeds gave a linear graph. The percentage increase in performance, in moving from DDR 266 to DDR 400, on our *Unreal Tournament 2003* tests, was approximately eight per cent. On overall scores, the difference was almost 21 per cent. The price difference is about Rs 1,000, which works out to approximately 33 per cent more.

Conclusion

A RAM module can run at its full clock speed only if the motherboard supports it. If you purchase a DDR 400 RAM stick, and you have a motherboard that only supports DDR 266, the RAM will run at DDR 266. As with processors, when you purchase RAM, you need to consider what you use your computer for. Do you use it primarily for office work with a little gaming thrown in? Or are you the user who dabbles with audio-visual stuffs a lot of gaming?

Irrespective of what you do, what remains clear is that with the increasing amount of resources that newer applications demand, RAM plays a critical role. We do not recommend DDR 266, as the price difference compared to DDR 333 is only a few hundred rupees. The DDR 266 module we tested, which had Hynix chips, was from Zion.

For running a mix of applications consisting of office applications, games and movies, the Transcend DDR 333 is highly recommended. If price is a constraint, you might want to look at the Hynix DDR 333.

If you do lots of video and audio editing, work on databases, or if you're the avid gamer who needs the utmost performance out of the computer, DDR 400 is what you will need. Though you'll have to pay a premium, the performance will be worth it—of course, provided you have a system that will employ the RAM at full steam.

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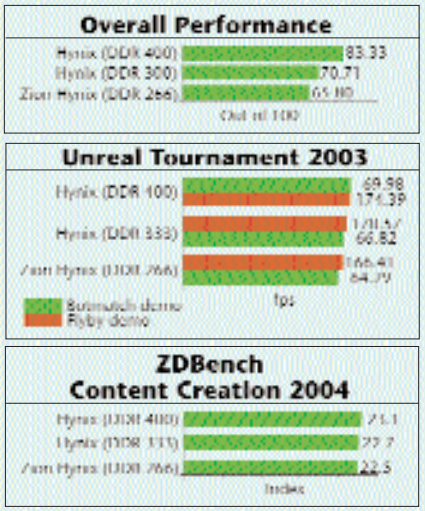
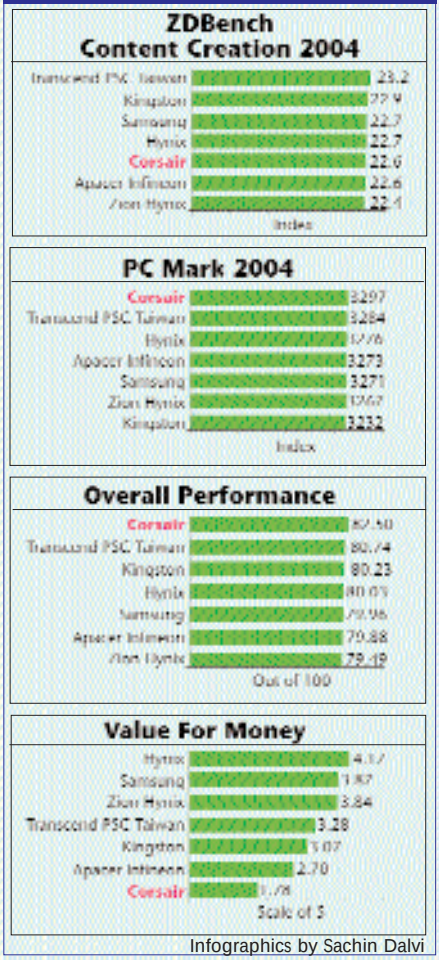
Variable Clock Speeds



DDR 333 Scores



Infographics by Sachin Dalvi

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Time's Up

...for a CPU upgrade? Here are 11 contenders for the slot

The mini-budget is out, and that means it's upgrade time! With this in mind, we try to find the perfect complement for the motherboards we compared in *'A Board's-eye View'* on page 40.

One look at the market, and it's clear that options are limited to just Intel and AMD; VIA is out there somewhere, but its appeal is severely limited. Motherboards that use VIA processors are proprietary, with far fewer upgrade options. The performance of these systems can't be compared to that of the Pentiums or the Athlons. Therefore, we'll be concentrating mostly about AMD and Intel CPUs. We received and tested 11 processors in all.

A look under the hood

Intel Pentium 4 processors are based on the Northwood core *(See box 'CPU Codenames Demystified')*, with 512 KB of L2 cache. The Celeron, however, only has an L2 cache of 128 KB, and runs at 400 MHz Front Side Bus (FSB). It falls in the Value category.

Newer processors such as the Intel Pentium 4 3.2 GHz and the Intel Pentium 4 2.8C GHz use the same core technology. The difference is in the FSB, which has been pumped up in both processors to 800 MHz, effectively resulting in an increase in processing speed.

With the introduction of the 2.8C GHz processors, consumers have tasted Hyperthreading—a technology that enables one processor to execute two instruction sets at the same time. Each of these instruction sets can be independently halted or interrupted. To the OS, it appears that the system has two processors. Applications such as Adobe Photoshop and 3DStudio Max benefit greatly from this architecture, and have threading-specific optimisations.

All the processors in the Pentium 4 line-up are based on the same core; performance differences are due to increased core clock frequencies and pumped-up FSBs. These increased FSB speeds only give a slight performance increase if the clock speeds change marginally. It makes more sense to keep a Pentium 4 2.8C, rather than getting a Pentium 4 3.0 GHz, which will cost you an extra Rs 3,200.

In the AMD line-up, we had four mainstream processors—the Athlon XP 2400+, the Athlon XP 2600+, the Athlon XP 2800+ and the Athlon XP 3200+. The Athlon XP 2400+ is based on the Thoroughbred core, and is fabricated using the 0.13 micron process. The Thoroughbred core supports features quite different from what Intel processors do. The fabrication process is the same, but there's a new thermal diode, along with a robust cooling solution. The Thoroughbred core also features 3DNow! Professional technology, with Streaming Single Instruction Multiple Data Extensions (SSE) compatibility. This lets it run applications such as games, video-encoding and multimedia that use the SSE instruction set.

With the introduction of the Athlon XP 3200+, AMD has introduced the new Barton core with an FSB of 400 MHz, while the core clock speed of the processor is still 2.2 GHz. The major difference is that the L1 cache has been increased to 128 K, and the L2 cache has been pumped up to 512 K. This gives the 3200+ a performance increase over its earlier Thoroughbred counterparts. In fact, the Barton core has now been moved to the AMD 2800+ models, and is available in the market. To identify a Barton Athlon XP 2800+, all you need to check is the amount of L2 cache memory, mentioned on the box—it should be 512 KB. AMD has also released a new version of the 2600+ with 512 KB of cache, but the processor still runs at 333 MHz FSB.

IMAGING: Atul Deshmukh

How We Tested

Our benchmarks comprised SPECviewperf, POV-Ray, Ziff-Davis Multimedia Content Creation and Business Winstone tests, SiSoft Sandra 2004, video encoding tests, multi-tasking tests, Super Pi calculations and gaming tests that included synthetic and real-world games. The benchmarks were in three groups:

The first included SPECviewperf, POV-Ray and Super Pi, which test the Floating-Point Unit (FPU) of the processor. Scores are given in seconds for each of these tests. The second group consisted of the Office Application and Content Creation benchmarks, which included the Ziff-Davis and PC Mark benchmarks.

The last section included gaming, multi-tasking and video encoding benchmarks.

Every benchmark we used is CPU intensive. For example, the POV-Ray and the Super Pi calculations take the same time to complete irrespective of the other components of the system. But results are affected if the memory subsystem, including the hard drive and memory modules, are replaced or changed. With this in mind, we ran the benchmarks for the Intel processors on an Intel D875PBZ with Corsair TWINX DDR 400 512 MB RAM and a Seagate Barracuda 7,200-rpm hard drive. We used the GeForce4 TI 4600 128 MB graphics card, and an Audigy2 sound card. For benchmarking the AMD processors, we used a GigaByte GA-7KNNXP based on the n-Force 2 chipset from nVidia. The video card was again the GeForce TI 4600, and we used the onboard SoundStorm audio chip. The RAM modules and the hard disk remained the same. As expected, the Intel-AMD competition was tough, with pros and cons on both sides.

The benchmarks we used

SPECviewperf: Measures OpenGL 3D rendering. When 3D rendering is involved, you can be sure that there are lots of Floating Point Unit (FPU)-intensive operations, which place a major load on the CPU.

POV-Ray: An open-source ray-tracing software. Ray-tracing involves intensive use of the FPU of the CPU. So, the better the FPU, the faster is the rendering of an image.

Ziff-Davis PC Magazine Content Creation Benchmark: Tests the entire system, with emphasis on the CPU, and uses real-world applications such as Adobe Photoshop and NewTek LightWave.

Ziff-Davis PC Magazine Business Winstone Benchmark: Uses Office applications such as Word and Excel to test performance.

FutureMark PC Mark 2004: This benchmark consists of a separate battery of tests just for the CPU. It uses small chunks of real-world applications such as video encoding and file compression.

SiSoft Sandra 2004: A synthetic benchmark, comprising two tests: the first is the CPU Integer Benchmark that gives us the Dhrystone and Whetstone results of the CPU. The other is the CPU multimedia benchmark, which gives a score by generating a visualization of the Mandelbrot fractal.

Video Encoding Test: Involves the conversion of a 50 MB .vob file to DivX using Dr. DivX. We used the DivX PRO 5.05 codec.

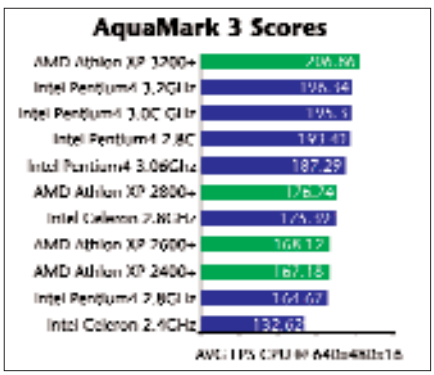
Multi-tasking Test: Involves the video encoding test while opening a 502 MB TIFF file in Adobe Photoshop.

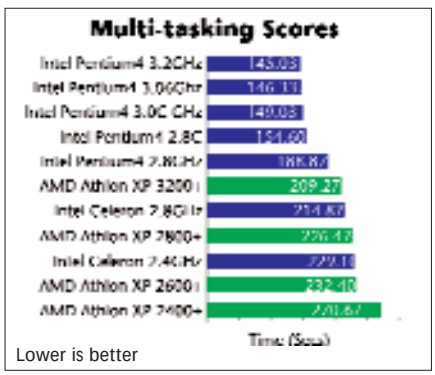
Super Pi Calculation Test: Calculates the value of pi (22/7) to a specifiable number of million floating points. This could be anywhere from two to 32 million. The score is the time taken for calculation.

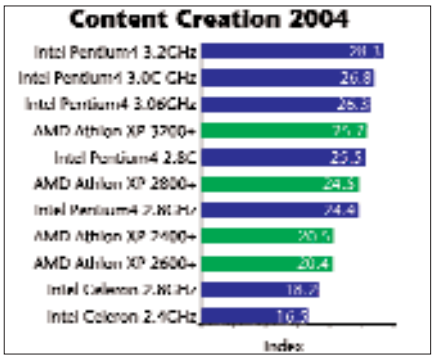
Aquamark3: The latest gaming benchmark, based on a real-world game engine that puts to test the entire graphics and memory subsystem. After running it, CPU-specific FPS scores can be obtained. These are taken as the scores.

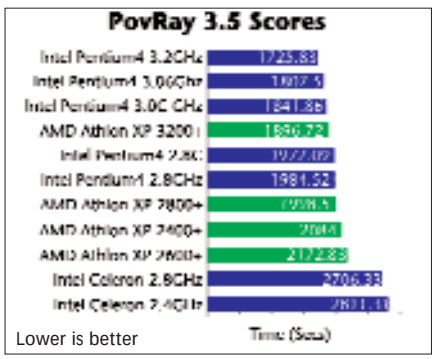
UT 2003: A real-world game benchmark based on the DX 8.1 API that runs different game scenes to give a combined score in frames per second (FPS).

Serious Sam 2: A real-world OpenGL game benchmark which results in an FPS score.









Sachin Dalvi

Conclusion

In the end, it boils down to how the CPUs fared against each other. The differences in architecture are apparent, since each manufacturer implements clock speeds and FSB speeds differently. The L1 and L2 caches, too, come into play. Both manufacturers have made cache as well as FSB changes on their processors, for performance gains.

A Celeron running at 400 MHz FSB with 128 KB of L2 cache will not perform as well as a Pentium 4, because of the lower FSB and the smaller caches, even if the clock speed is the same. And that's where the price factor rears its head.

The decision is rather simple, really. The Celerons are a viable option for a Rs 20,000 computer, one that is not often used for heavy data processing applications say, games or audio and video editing. It's ideal if you only need to work with Office applications and the like—optimisations in the Northwood core won't give you a performance increase in

CPU Codenames Demystified

AMD

Palomino: The first Athlon XPs from AMD, ranging from the 1500+ to the 2100+, were successors to the aging Athlon Thunderbird series. These processors have an L1 cache of 128 K and an L2 cache of 256 K. The first Athlon XP made its appearance in October 2001.

Thoroughbred: The current Athlon XPs available from AMD. These have an L1 cache of 128 K, and an L2 cache of 256 K. This core debuted in June 2002 with the Athlon XP 2200+. It was revised, and the newer Thoroughbred B cores are present on the Athlon XP 2800+, with an FSB of 333 MHz.

Barton: Thought to be the last in the Athlon XP range of processors. It features the same FSB as the Thoroughbred B, with the L2 cache increased from 256 K to 512 K. The first model starts with the 2800+ tag, and goes on. Currently, available up to 3200+.

Hammer: The latest entrant in the desktop and mobile processing market. It has 512 KB of L2 cache, with a new 940-pin design and 64-bit computing, with native support for existing 32-bit applications. It debuted in October 2003.

ClawHammer: This scaled down version of the Hammer will be out by the middle of 2004.

INTEL

Tualatin: The last of the Pentium 3 cores. It has an L2 cache of 512 KB. The Celeron 1.4 GHz is a Tualatin with 256 K of L2 cache, and a 100 MHz FSB.

Williamette: The original edition of the Pentium 4. It initially had an L1 cache of 128 K and an L2 cache of 256 K. The new Celeron 2.0 GHz is based on this core.

Northwood: The Pentium 4 currently available, with 512 K of L2 cache. It's available in two variants—the non-Hyperthreaded 400 MHz FSB version, and the 533 MHz and 800 MHz versions with Hyperthreading. The latest and fastest is the Pentium 4EE, which features the introduction of the 2 MB L3 cache.

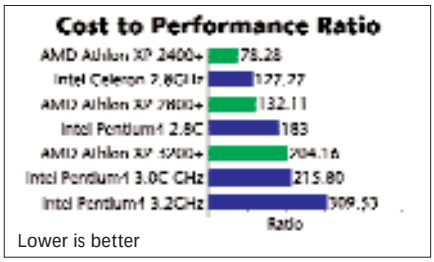
Prescott: Originally slated for release in 2003, it's been delayed until 2 February 2004. It's the next fabrication change for the Pentium 4 processors with higher speeds, starting from the Pentium 4 Prescott 2.80A to the Intel Pentium 4 Extreme Edition 3.40 GHz. The L2 cache has been increased to 1 MB for these processors, except for the EE, where the L2 cache has been stepped up to 2 MB.

this case. The Pentium 4 3.2 GHz costs Rs 5,000 more than the Celeron does, and that's for the processor alone!

On the other hand, games and image editing applications such as Adobe Photoshop are resource-hungry; similarly, video encoding applications such as FlaskMPEG and Dr. DivX, or for that matter, Windows Media Encoder, will be more than happy with any resources that the CPU can provide. If these are typical of the applications you intend to run, we recommend at least a Pentium 4 2.8C GHz.

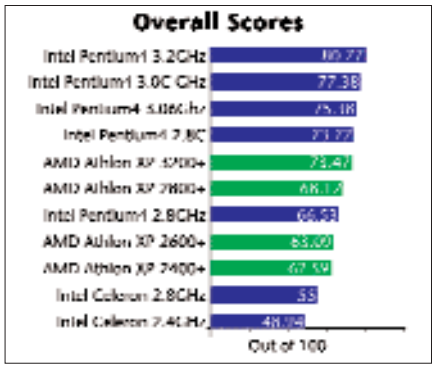
If you'd like the best of both worlds, we suggest an AMD. The Celeron 2.4 GHz costs Rs 6,200. The Athlon XP 2400+ costs Rs 4,900 and gives you a performance gain of approximately 22 per cent. Thus, the 2400+ is not only cheaper but also gives you a better performance.

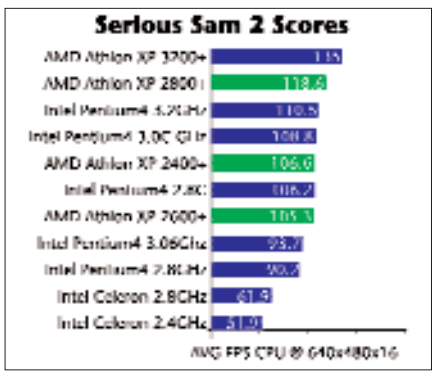
The blazing performance of AMD 3200+



equalled that of the 2.8C GHz, but fell behind the Pentium 4 3 GHz and 3.2 GHz processors. The Athlon XP 2800+, which is clocked lower than the Pentium 4 2.8 GHz scored better than it, but fell behind the Pentium 4 2.8C GHz and beyond.

The score percentage difference between the AMD 3200+ and the Pentium 4 3.2 GHz is 9 per cent, but the AMD costs a whopping Rs 10,000 less. The architecture and its implementation are at play





here—AMD's processors give excellent performance even when clocked at lower speeds. But it's apparent from the scores that the king of the hill is the Pentium 4 3.2 GHz. It retails for Rs 25,000. This is a significant investment for just one part of the computer, but the performance is worth every penny.

If price is no object, check out the face-off between the Pentium 4 EE and the AthlonFX. ➜

AMD Processor Naming Conventions

AMD insists that one should look at performance rather than clock speeds. As a result, clock speeds aren't mentioned; they are indicated, in a relative way, by the number in the processor's name, which is the Performance Rating Number (PRN).

To complicate matters, the Athlon XP PRNs are based on how fast the older Thunderbird Athlon would have to run, to give the same performance of the Athlon XP processor in question. For example, an Athlon XP 1500+ actually runs at 1.33 GHz. This implies that the Athlon XP 1500+ (1.33 GHz) performs as well as a Thunderbird Athlon running at 1.50 GHz.

An increase of 66 MHz in clock speed translates to an increase of 100 MHz in PRN. Now, this works at lower speeds, but the higher you go, the larger the gapbecomes. To address this, AMD has revised its XP rating system a bit. Using the old system, the 2400+ should be running at 1.93 GHz, but actually runs at 2 GHz, reflecting the new rating system.

FACE OF

The Pentium 4 3.2 GHz Extreme Edition (EE) is Intel's latest release to counter the Athlon 64 FX threat. Apart from a whopping 2 MB on-die L3 cache on the Pentium 4 EE, it isn't too much of a departure from the regular Pentium 4 3.2 GHz. The FSB is the same, and so is the core architecture. The EE doesn't have any extra processing units, and depends solely on the tri-level cache architecture.

It has a 2 MB L3 cache on top of the 8 KB L1 cache and the 512 KB L2 cache that was introduced with the Northwood core. This increases the the transistor count, which ultimately increases power consumption. The L3 cache does push up the EE's scores, but lets the processor down in multi-tasking jobs and video encoding. Overall, it doesn't do too much for the EE.

The 64 FX is based on a spanking new core codenamed Hammer. The L2 cache has been increased to 1 MB. Why is AMD doing this? Because the current x86 family of processors is limited to addressing only 4 GB of memory. Sooner or later, make no mistake, this limit will need to be crossed.

AMD has redesigned the core for this CPU. Part of the older 32-bit design is still in place, but registers have been added that are active in the 64-bit mode. The term '64-bit' that is bandied around does not mean a giant leap, just that the data path has been changed from 32-bit to 64-bit.

The 64 FX also includes some on-die features that makes it perform better than the Barton core: HyperTransport links, the Silicon On Insulator (SOI) technology and SSE2 support. HyperTransport is a high performance, point-to-point link for integrated circuits. The memory controller is integrated on the processor, the CPU can communicate directly with memory without depending on the motherboard chipset.

This means the FSB speed doesn't matter, and AMD claims that the 64 FX can communicate with motherboard chipsets at speeds of up to 1,600 MHz. The memory controller interfaces with system RAM through a DRAM controller, and can be modified as new memory standards emerge. One drawback of the 64 FX is the need for registered or ECC memory—ECC memory comes at a premium.

Conclusion

Intel has a tough task ahead—making a processor to combat the 64 FX.

In all the tests that we ran, the 64 FX dominated the EE, except in the SiSoft Sandra 2004 and PCMark PRO tests. We also carried out tests for the 64-bit capabilities of the 64 FX in Red Hat Enterprise Linux WS. Our suite of Linux 64-bit tests included Unix Bench and nbench. The Athlon FX performed better than the Pentium 4 EE in most of the tests. This goes to show that the processor does well in large double-precision floating-point calculations. The gaming tests were also dominated by the 64 FX, except for the *Quake III* test run, where the EE made the Athlon look puny.

The Pentium 4 has its strong points in being compatible with current motherboards and DDR RAM modules, whereas AMD has gone through a complete makeover for the 64 FX. The EE's gaming scores were commendable, however, and one can't dismiss it offhand.

Microsoft is planning a 64-bit Windows XP release in a few months' time, and there are already 64-bit Linux OSes. *Unreal Tournament 2004*, to be out late this year, is touted as the first game supporting 64-bit processors. Overall, the Athlon 64 FX-51 processor is currently the one that we recommend, if you have that kind of money and if you want to have the 64-bit tag on your desktop, with performance across all applications.

The EE, on the other hand, seems to be an Emergency Edition from Intel, with not much performance gain over the regular Pentium 4 3.2 GHz. The added L3 cache does not give it much of a boost in running applications any faster. Intel needs to bring out something new to combat the Athlon FX. Perhaps the Prescott will bring in good news for them!

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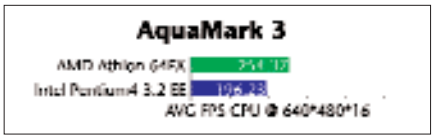
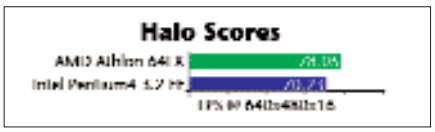
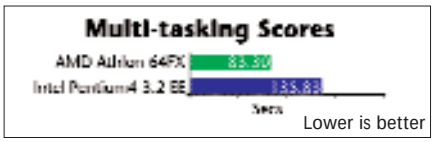
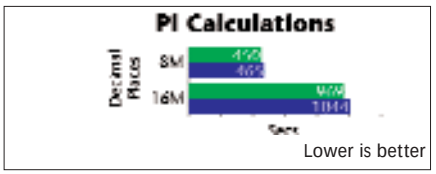
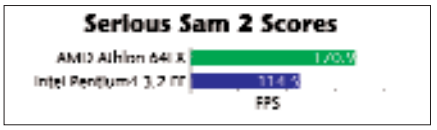
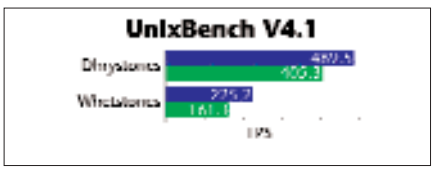


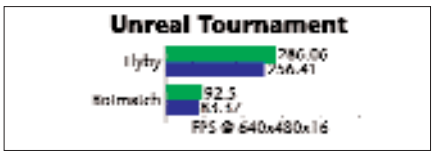


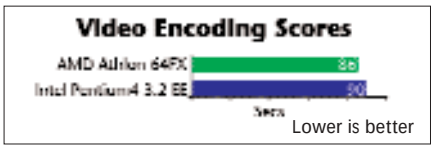


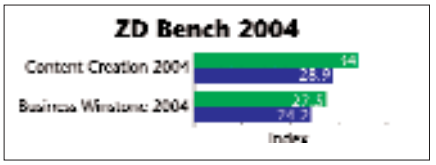












Everywhere you go...

...always take your data with you

Your office may be where your workstation is, but 'work' may just happen someplace else—in the car, on the plane, or at the dinner table. Laptops, stacks of fragile CDs and redundant floppies can be the way to go, but not in the longshot... floppies are almost defunct, with their miniscule space and inherent frailty. CDs are better, but be careful not to scratch, drop, or handle them with any amount of clumsiness.

Enter stage right, portable storage devices—thumb drives and external hard drives. They're portable, reliable and self sufficient, doing away with peripherals such as floppy drives and CD-ROM drives. With the availability of better and faster interfaces such as USB 2.0 and FireWire, the data transfer speeds have greatly improved. Here we pit the best available against each other and help you decide which one is a perfect match for your requirements.

There are different types of drives that are made to suit various needs. Thumb drives may have low capacities, but they are reliable and extremely portable. You can just pop one into your pocket, and have all your urgent data within easy access. Portable hard drives, on the other hand, have oodles of space, but aren't really as portable as the name suggests. These are good for backing up or transferring large amounts of data between two PCs—such as between your home and office.

Mexy Xavier

USB THUMB DRIVES

By virtue of their extremely small sizes and low weight, USB thumb drives are easily the most portable storage solutions available today. A discernible benefit with these devices is the absence of any moving parts whatsoever, which means almost no maintenance issues as compared to other storage solutions. Though older thumb drives suffered from low storage volumes, the advances in memory technology are changing this scenario for the better.

Features

We received 16 models, with data capacities varying from the abysmally low Freecom 32 MB drive, to the absolutely monstrous 1 GB drive from Princeton. So while analysing the features of each drive, we did not consider the storage capacity, but paid more attention to the physical characteristics and build-quality in relation to its effects on the mobility of the drive.

The EasyDisk 128 MB was the clear winner; primarily due to its decent software bundle and its good scores in our tests

As far as physical dimensions are concerned, all the drives were quite small and had relatively low weight. The lightest drives we received were the 64 MB and 128 MB models from Princeton, which weighed 8 gms. The heavier models included the 512 MB drive from Transcend, which weighed around 24 gms, as well as the solitary 20-gm Freecom FM-1. The extra weight of the FM-1 was due to its sturdy and durable design. Most other models sacrificed durability for weight, using poorer material to get better visual appearance and lower weight. Some drives did manage to attain a decent balance between good design and appearance. The Nexdisk and Transcend drives had exceptional designs and an attractive silver finish. All the drives had a single LED to indicate when they were powered and transferring data.

One major letdown with all the drives was that they used the slower USB 1.1 interface—all except the 1 GB beauty from Princeton, which uses USB 2.0. The advantage of USB 2.0 is obvious in the performance tests, as the Princeton 1 GB simply obliterated the competition. It's sad to see that manufacturers are slow to incorporate the USB 2.0 technology that has been around for quite a while now. The fact that USB 2.0 data transfer speeds are as much as 40 times higher than USB 1.1, should be enough reason to make the switch.

Another important aspect we considered was the presence of inbuilt security functions. As most of these devices are tiny, they can be easily misplaced or stolen—very troublesome if the drive contains sensitive documents and files. Another need for security could arise if the drive is used by two or more people: you lend the drive to your friend to transfer documents to his or her computer, but you don't want them modifying or deleting anything, accidentally or otherwise. Almost all the drives we tested had a simple and accessible write-protection switch on them. The Touchmate TM-USB256 had a small switch inside a groove

How We Tested

Due to the varying type of the portable storage devices we received, we had to take different approaches during our test process. Our test configuration, however, remained the same with a P4 3.06 GHz processor with Hyper-Threading enabled on an i845 chipset-based ABit BG7E motherboard and 256 MB RAM. A Seagate 40 GB hard disk was utilised as the primary system storage device, and was clean-formatted before loading Windows XP. All the latest drivers for the motherboard and USB ports were loaded. To maintain a standard environment, we installed only the required benchmarking utilities and the files that we used in our tests.

Test Methodology

All the storage devices we tested were evaluated on the basis of their scores in three primary factors, namely features, performance and value for money. To help in our calculations, we assigned a relevant amount of percentage points to these parameters. These parameters included:

Features: Features made up 15 per cent of the total score. We looked at the various inbuilt characteristics and qualities of each gadget. Considering that every product was marketed as a portable device, we laid particular emphasis on the drive's weight and dimensions. We also observed the build-quality, with primary importance given to the sturdiness of the product. We gave extra points for any security features such as a write-protection switch, and also for useful software in the package.

Performance: To gauge the performance—which made up 85 per cent of the score—we conducted two types of tests—synthetic and real-world. For the synthetic tests, we used the SiSoft Sandra Professional 2003 benchmarking suite to assess theoretical read and write speeds, as well as the average access time. We also tested with the more specific HDTach 2.7 benchmark and noted the average CPU utilisation of each drive.

In the real-world tests, we transferred a set of assorted files of varying sizes totalling up to 1 GB, back and forth, from the system hard disk to the external hard disk, and noted the time taken during each transfer. Similarly, for noting the sequential speeds, we transferred a large image of 1 GB between the system and the external drive.

For the thumb drives, the same test process was followed, with only the size of the test files reduced to 20 MB. Due to the varying storage capacities of each model, we also carried out an additional test, where the thumb drive was filled to its maximum size with both sequential as well as assorted data. We observed the time taken for each transfer, and then calculated the actual data transfer rate in terms of megabytes transferred per second.

Value for money: We noted the actual capacity, and not the rated capacity, of each drive after formatting, and divided it by its price. This gave us a cost index of price per MB value, indicating the cost-effectiveness of each product. Finally, to obtain the VFM quotient, we divided the sum total of our performance and features by the cost index we just calculated.

on the side of the device, and it was difficult to even activate the switch—we finally succeeded, using a pin. Some drives such as the ones from Transcend and the Freecom FM-1, were also bundled with password protection utilities.

Speaking of utilities, all the drives, except the ones from Princeton, had some software and other accessories bundled. The Princeton drives were the only ones to be delivered without any accessories whatsoever—no driver CD, or USB cable. Naturally, they scored the lowest in our features comparison, and finished at the bottom. The Nexdisk PSD-64N had possibly the most valuable tool bundled along, Jungsoft's DataSheriff backup and recovery software. It also had the standard USB cable, a neck-strap and even a quick start guide, as did most other drives.

The TS512MJFLASHA won the Best Value award due to its above-average performance and low price of Rs 9,000

Performance

If thumb drives are to be utilised extensively on the move, they need to be fast and perform well. The Sisoft Sandra and HDTach benchmarks helped us assess the theoretical speeds and access times of the drives, to find and open any random file located on it.

Sisoft Sandra Professional 2003: The drive index is a combined score indicating the overall performance of the device, and it represents its performance in everyday usage. The maximum drive index value we obtained was from the Princeton 64 MB drive, followed closely by the Touchmate model, with scores of 945 and 944 respectively. The 128 MB Princeton drive followed in a close third, with a drive index of 941. Although nearly all the drives managed to perform well, the Freecom FM-1 and the Nexdisk PSD-64N finished at the bottom with their drive indices not even crossing the 700 KBps mark. The low drive index scores means that they will be a lot slower than the others to copy and move larger files such as video and audio clips. The results were similar for the random write speeds: the Nexdisk 64 MB drive logged the lowest score of 360 KBps, while the Touchmate and the Princeton drives were the fastest again.

HDTach 2.7: The read burst speed for all the drives remained constant at 1 MBps. Similarly, the CPU usage of the drives remained negligible—only the Transcend 512 MB and Princeton 512 MB logged values of 1.2 and 1 per cent respectively. This low CPU utilisation is ideal for laptops, and will leave the processor free to tackle other more important system tasks. The random access times also hovered around 6 milliseconds across all the drives—the exceptions being Nexdisk and Transcend again. In fact, the Nexdisk showed a pathetic random access time of 68.5 milliseconds.

Real-world tests: Unlike synthetic benchmarks, real-world tests measure the actual performance of the device in normal usage conditions. In the first test, the Princeton 128 MB drive completed the assorted file read test with the fastest time of 23.45 seconds. Coming in second was its 64 MB sibling, with the EasyDisk and the Touchmate 256 MB drives following. The assorted write test had nearly the same results, except that the Princeton 64 MB drive topped this time. The Freecom FM-1 stood dead last, with a bad time of 117 seconds—about double that of the other times. The assorted file tests measured the time taken to transfer a random collection of data such as a set of documents, presentations, images, etc., which is what a user would normally transfer. Thus, low scores in this test indicate a drive's inability to handle varying amounts of data while copying and writing.

Since the storage capacities varied substantially, we decided to carry out one more test: we checked each drive's transfer speeds when handling their maximum capacity of data. As the drive's maximum capacities were varied, we created separate assorted test folders and sequential data files for each capacity. We divided the amount of data transferred (MB) by the time taken for the transfer (s) to come up with the real data transfer rate (MBps).

The Princeton 128 MB drive took top spot with a sequential transfer rate of 2.3 MBps. The Transcend 128 MB came second with a transfer rate of 2.06 MBps, while the 128 MB Apacer Handy Drive finished last with 0.93 MBps. In the assorted file transfer test, none of the drives could cross the 1 MBps mark; the 256 MB Princeton came closest with a speed of 0.85 MBps.

Value for money

The one real advantage with USB flash drives is that they have absolutely zero maintenance and a long life span—the specifications in the manuals claim a lifespan of about 10 years. However, deciding on the most cost-efficient drive is also important, as buying the largest drive doesn't always guarantee you maximum benefits. This is where our value for money quotient helps ascertain the right model for you.

In terms of actual value for money, the Transcend 512 MB model is quite a steal—it costs only Rs 9,000 and performed well in our tests. The other 512 MB drive, the Princeton MPD512, costs four and a half thousand more. The most uneconomical drive in our comparison was the Freecom FM-1 drive, which has a whopping cost of Rs 72.58 per MB of storage space.

Princeton 1 GB USB 2.0

In the thumb drives shootout, we actually received 15 pieces for carrying out our tests, but had to leave the Princeton 1 GB USB 2.0 drive out of the comparison. This was only due to one reason—with its faster interface, this drive simply blew the competition away. For example, in the Sisoft tests, the highest drive index score of 945 was reported by the 64 MB Princeton model. The 1 GB Princeton drive obliterated this score, recording a drive index of 7,350—over seven and a half times higher. With such a lop-sided comparison, we had no choice but to exclude this drive from the main competition. This drive also showed random read and write speeds of 8 and 2.2 MBps respectively—comparable to the some of the values reported in the external hard drives comparison. It was the same story in the HDTach benchmark: the 1 GB Princeton logged the fastest random access time in the entire comparison-fastest in both the thumb drives and external hard disk section. In the real world maximum capacity tests, the sequential read and write speeds were an astounding 6.20 and 6.55 MB/sec respectively. It is somewhat expensive with a price tag of 28,000 and a cost per MB of a little under Rs 28. With its superlative performance and high capacity, this is the best you can get—if you can afford it.

And the winner is...

In the end, we found that although the Princeton drives topped all our tests, their absolute lack of bundled accessories—not even a driver CD—ensured a low overall score. If you are looking for a drive with sheer performance, and software and accessories really don't matter, opt for the Princeton MPDUSB64MB drive.

On the other hand, the 128 MB Easy Disk drive gave an above-average showing in the performance tests, and with its extra software, won the Best Performance award. The Transcend 512 MB drive chalked up some decent scores in our tests, and has a low cost per MB of just Rs 18.22. Thus, it was the clear winner for the Best Value award.

EXTERNAL HARD DRIVES

Purely in terms of mode of operation and drive mechanics, there is virtually no difference between internal and external hard disks. However, with a USB or FireWire interface, an external hard drive packs in greater flexibility and ease of installation. For our comparison, we received eight drives, out of which four were of the faster 7,200-rpm type, and the rest were smaller drives with speeds of 4,200 rpm.

Features

The one thing that stood out in the hard drive comparison was that all the drives we tested were USB 2.0 compliant—unlike the USB drive comparison. The Iomega 120GB also supported a FireWire interface, and was the largest capacity drive we got. It was heavy and bulky, but the heaviest were the 40 GB and 80 GB Freecom FHD-1 models, weighing 900 gms. The heavy Iomega and Freecom drives also depended on an external power source, confirming that they are more suited for desktop use. At the other end of the scales, were the two Freecom FHD-2 models, weighing 190 gms.

The Freecom FHD-1 40 GB offered simple data synchronisation and an excellent overall performance to bag the Best Performance award

Despite being the lightest in the test group, the FHD-2 drives still looked far sturdier than their desktop equivalents, especially with their smooth and sleek bodies. The FHD-1 drives, in comparison, only managed to look good with evenly contoured bodies and cool blue LEDs on the front panel. The Transcend drives were also very light, and were the only ones to give directions on how to replace the internal disks from within their casing. All the 4,200-rpm hard drives had a smaller 2.5-inch form factor, as they use mobile hard drives. Hopefully, the recent release of the faster 7,200-rpm mobile drives, with the 2.5-inch form factor, will improve the external drive products.

In terms of added functionality, the Freecom FHD-1 drives clearly had the upper hand with a data Sync button on the front panel. This button allows synchronisation of data between the external device and the system disk, with the help of the bundled FSync 2.0 software. FSync is fully compatible with Microsoft Briefcase, and can be used to easily transfer your data and synchronise your files between computers. As for the software bundled, the Freecom FHD-2 drives came packaged with Acronis TrueImage, a utility for creating images and snapshots of hard drives on external drives. The drives from Iomega came with a lot more, including Iomega's own Automatic Backup software as well as Norton Ghost 2003. Another useful utility is the Iomega FAT32 formatter, which can format large drives and partitions.

The Transcend drives were disappointing, and only provided a driver CD, power and USB cables. However, they came with something that no other drive—portable or external—could match: they were packed in a stylish leather case, along with the requisite data cable and also a visiting card-sized driver CD. The inclusion of the carry-case clearly added a lot of value to the Transcend drives, increasing their portability factor.

Performance

Let's take a look at how the drives did in each of the performance tests we put them through:

SiSoft Sandra Professional 2003: In the Sisoft benchmark

USB 2.0 v/s FireWire

Out of the eight external hard drives we received, the Iomega 120 GB model was the only drive which featured a FireWire interface in addition to USB 2.0. The difference in the theoretical transfer rates between the IEEE 1394 standard and the USB 2.0 interface is only 80 MBps, with the latter running at 480 MBps. To ascertain the effects of this difference in an actual test scenario, we ran our tests again on the Iomega drive, but this time, we connected it through the FireWire interface.

Surprisingly, the Sisoft Sandra scores put USB 2.0 on top, with a drive index of 22,308 KBps as compared to 18,703 KBps with FireWire. The USB interface won again in the sequential read and write speed tests with scores of 32 MBps and 26 MBps respectively, as compared to the slower 27 MBps and 21 MBps with FireWire.

In the HDtach benchmarks, FireWire scored better with an average write speed of 20.5 MBps, as opposed to 17.3 MBps with USB 2.0. Also, HDTach reported a 0 per cent CPU utilisation with FireWire, as compared to 18.3 per cent using USB.

In the real-world tests, the USB interface was the clear winner as FireWire was barely able to have a faster assorted write speed taking 58.76 seconds to write a 1 GB folder, as compared to 59 seconds in our primary tests. The real difference in the two standards was highlighted in the sequential write test: with the FireWire interface it took seven seconds longer to copy our 1 GB test image than with USB—103 seconds with FireWire and 96.6 seconds with USB 2.0.

SCORE BOARD

CATEGORY	USB - HARD DRIVES				
Brand	**Freecom**	**Freecom**	**Freecom**	**Freecom**	**Iomega**
Model	FHD-1 40 GB	FHD-1 80 GB	FHD-2 20 GB	FHD-2 40 GB	80 GB
FEATURES (30%)					
Drive Specifications:					
Physical Dimensions (L x W x H) (mm)	186 x 112 x 47	186 x 112 x 47	140 x 80 x 19	140 x 80 x 19	184.2 x 114.3 x 34.3
Weight (in gms)	900	900	190	190	817
Drive Form factor (in inches)	3.5	3.5	2.5	2.5	3.5
Capacity (in GB)	40	80	20	40	80
Spindle speed (in rpm)	7200	7200	4200	4200	7200
Data Buffer size (in MB)	2	2	2	2	2
Interface type	USB 2.0	USB 2.0	USB 2.0	USB 2.0	USB 2.0
Visual Indicators	Power, Data transfer and Synchronise	Power, Data transfer and Synchronise	Power and Data transfer	Power and Data transfer	Power cum Data transfer
Additional configurable buttons	1, Sync data	1, Sync data	✗	✗	✗
Build Quality					
Sturdiness (Scale of 5)	3	3	4	4	3
Aesthetic design (Scale of 5)	4	4	3.5	3.5	3.5
Package contents					
Bundled software	Fsync 2.0	Fsync 2.0	Acronis TrueImage	Acronis TrueImage	Iomega AutoBackup, Norton Ghost 2003, Iomega Fat32 fomatter tool
Carry-case included (Y/N)	✗	✗	✗	✗	✗
Other accessories	Power cable, data cable	Power cable, data cable	Power cable, data cable	Power cable, data cable	Power cable, data cable
Documentation (Y/N)					
Quickstart guide	✔	✔	✔	✔	✔
Manual	on CD	on CD	on CD	on CD	on CD
PERFORMANCE (70%)					
Sisoft Sandra Professional 2003 Drive Benchmark					
Drive Index (in KBps)	22687	22631	14591	18904	22036
Sequential Read (in MBps)	33	31	21	27	31
Random Read (in MBps)	7	8	4	5	7
Sequential Write (in MBps)	27	27	21	26	27
Random Write (in MBps)	9	12	5	7	11
Average Access Time (in milliseconds)	8	6	11	11	7
HDTach 2.7					
Random Access Time (in msecs)	16	13.8	19.3	20.9	18.8
Average Read Speed (in MBps)	24	27.1	18.6	23.3	28.2
Average Write Speed(in MBps)	14.7	18.7	12.3	13.9	18.3
Read Burst Speed (in MBps)	34.3	34.3	34.2	33.9	34.4
CPU utilisation (%)	14.2	19.7	10	12.8	15.1
Real world file transfer tests					
Sequential Read (1 GB) (in secs)	51.5	65.48	106.74	47	51.04
Assorted Read (1 GB) (in secs)	53.66	52.09	61.69	53.86	56.9
Sequential Write (1 GB) (in secs)	45.41	115.33	55.11	84.35	59.07
Assorted Write (1 GB) (in secs)	58.33	55.62	73.92	62.76	87.69
Price per MB: (in Rs)	0.35	0.22	0.71	0.47	0.14
OVERALL SCORE					
Features	9.00	9.00	11.30	11.30	7.90
Performance	60.66	59.40	47.00	53.42	57.60
Overall Score (Performance + Features)	69.66	68.40	58.30	64.72	65.50
Value for Money	9.83	15.78	4.11	6.85	23.29
Grade	C	B	C	C	B+
Price (Rs)	13,500	17,000	13,500	18,000	11,000

tests, the maximum drive index score of 22,687 was logged by the 7,200-rpm 40 GB Freecom FHD-1 drive, followed by its 80 GB sibling. Most of the 2.5-inch form factor drives logged below the 15,000 mark, which highlights the disparity in performance due to the difference in the spindle speeds. The Freecom FHD-2 40 GB model was hampered by its slower speeds, but still managed to record a good drive index of 18,904.

The sequential read test was a more closely fought battle, with very little variations between the scores. The 40 GB Freecom FHD-1 came out on top on again, with a transfer rate of 33 MBps, followed closely by the Iomega 120 GB hard disk at 32 MBps. The sequential read rate is useful in determining the performance of a storage device, while working with very large amounts of sequenced and ordered data such as a large DivX video file.

HDTach 2.7: In the tests conducted with HDTach, the 80 GB FHD-1 was the quickest. It had the lowest random access time of 13.8 milliseconds. Next came the lower capacity 40

Decision Maker

You routinely copy and transfer	You require	We recommend	Price
Dozens of PowerPoint presentations and Excel spreadsheets	A thumb drive with a 128 MB capacity and above.	Easydisk 128 MB, Transcend TS512MJFLASHA	Rs 3,500 to Rs 9,000
Large amounts of uncompressed video files, images, and the likes	A fast USB 2.0 drive with storage space of 40 GB and above	Iomega 120 GB HDD, Freecom FHD-1 40 GB	Rs 13,500 to Rs 15,000

USB - HARD DRIVES

	Iomega	Transcend	Transcend
	120 GB	20 GB	TS40GHDENC
	184.2 x 114.3 x 34.3	145 x 80 x 17	145 x 80 x 17
	817	174	176
	3.5	2.5	2.5
	120	20	40
	7200	4200	4200
	2	2	2
	USB 2.0	USB 2.0	USB 2.0
	Power cum Data transfer	Power and Data Transfer	Power and Data Transfer
	✗	✗	✗
	3	3.5	3.5
	3.5	3.5	3.5
	Iomega AutoBackup, Norton Ghost 2003, Iomega Fat32 fomatter tool	✗	✗
	✗	✔	✔
	Power cable, USB 2.0 cable, FireWire cable	PS2 Power cable, datacable	PS2 Power cable, datacable
	✔	✔	✔
	on CD	on CD	on CD
	22308	14118	18796
	32	20	28
	8	4	5
	26	20	26
	12	3.94	6
	6	12	11
	18.7	21.6	19.4
	25.8	17.4	23.5
	17.3	10.5	13
	33.2	34.4	34.5
	18.3	8.4	12.5
	56.64	195.14	39.63
	53.07	61.16	51.83
	96.66	57.1	47.57
	59.01	75.82	60.98
	0.13	0.42	0.29
	7.90	10.10	10.10
	58.20	44.66	57.34
	66.10	54.76	67.44
	25.95	6.52	11.68
	A	C	C
	15,000	8,000	11,000

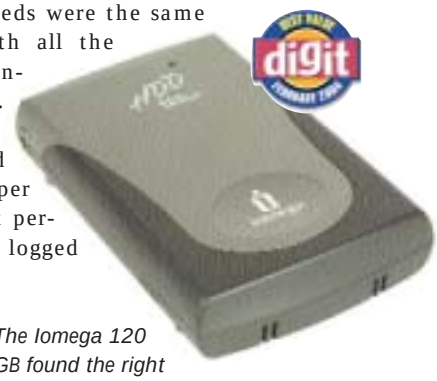
GB model, with an access time of 16 milliseconds. The rest of the drives all logged times from 18 to 20 milliseconds. The random access time helps us gauge the amount of time required for a drive to access and retrieve data from any random location. These drives logged higher access times than the desktop drive because of the USB interface.

Not Just Storage

The recent trend of combining different devices into a single base gadget has also extended to the portable storage area. The Apacer Audio Steno BP300 and the Creative Nomad MuVo are two very good examples of this. Essentially, both these devices are solid-state memory-based USB thumb drives, but also slightly modified to function as portable MP3 players. The Apacer Audio Steno also doubles up as a small and handy voice recorder. Both the MP3 players come with earphones, a neck-strap and the AAA battery to power the player.

For hard drive-based mobile storage, the iPod from Apple is easily the most stylish compact gadget. It comes with a 2-inch LCD screen and weighs just 176 grams. It features impressive support for various audio formats, and has a maximum capacity of 30 GB. It can give up to 6 hours of continuous playing time with its internal lithium-ion battery. Its price tag of Rs 45,000 for 30 GB, puts it out of the reach of most people, but that's what one would expect to pay for the funkiest gizmos available today.

The read burst speeds were the same across the board, with all the drives reporting a constant value of 34 MBps. Interms of CPU utilisation, the portable hard drives took the upper hand, with the lowest percentages of 8.4 and 10 logged in by the Transcend 20 GB and the 20 GB Freecom FHD-2 drives, respectively.



The Iomega 120 GB found the right mix by bundling great software, providing a huge capacity and an unbeatable price per MB of 13 paise. It won the Best Value award with ease

Real-world tests: Unlike in the synthetic tests, where we saw the larger 7,200-rpm drives winning throughout—except in the CPU utilisation—the real world tests witnessed a more spirited retaliation from the slower 4,200-rpm drives. In the sequential write test, where we copied a 1 GB TIFF image to the test device, and noted the time taken—the lowest time was recorded by the 40 GB FHD-1 drive with a transfer time of 45.41 seconds, followed closely by the Transcend 40 GB drive. However, in the sequential read test, where we copied the same file back to the system hard drive, the Transcend drive finished more than 11 seconds faster than the FHD-1 drive. This implies that if you frequently save and move large files, the Transcend drive will do a better job than the rest.

Contact details

Brand	Apacer	Easydisk	Freecom	Nexdisk	Princeton	Touchmate	Transcend
Vendor name	Xserve India Ltd	GNH Systems	J.S Equipments	Maatra Technologies	J.S Equipments	Sujata Electronics	Wales Technologies
Phone	080-5572601	022-24901333	022-23810713	9520-4221222	022-23810713	022-22885096	022-23828100
Fax	080-5572603	022-24904777	022-3860976		022-3860976	022-22840234	022-23877418
E-mail	info@xserves.com	usbflashmemo-ry@hotmail.com	jse@vsnl.com	info@maatratech.com	jse@vsnl.com	solutions@suja-ta.net	sales@media-mangroup.com

SCORE BOARD

CATEGORY	USB - THUMB DRIVES							
Brand	**Apacer**	**Apacer**	Apacer	Easydisk	Freecom	**Nexdisk**	**Princeton**	**Princeton**
Model	Handy Drive 32 MB	Handy Steno 1.1	Handy Drive 128 MB	128 MB	FM-1	PSD-64N	MPDUSB64MB	MPDUSB128MB
FEATURES (30%)								
Drive Specifications								
Dimensions (LxWxH) (mm)	85x28x15	85x28x15	85x28x15	81x22x15	73x22x10	80x20x9.5	59x18x10	59x18x10
Weight (in grammes)	17	17	17	11	20	12	8	8
Storage capacity (in MB)	32	64	128	128	32	64	64	128
Type of design (clip, keychain)	Keychain	Keychain	Keychain	Keychain	Keychain	Clip	Keychain	Keychain
Visual Indicators	Data transfer	Data transfer	Data transfer	Power and data transfer	Power and data transfer	Power and Data transfer	Data transfer	Data transfer
Interface supported	USB 1.1	USB 1.1	USB 1.1	USB 1.1	USB 1.1	USB 1.1	USB 1.1	USB 1.1
Write protection button (Y/N)	✔	✔	✔	✔	✘	✔	✘	✘
Build Quality								
Sturdiness (Scale of 5)	3.5	3.5	3.5	3	4	3.5	3.5	3.5
Aesthetic design (Scale of 5)	3.5	3.5	3.5	3	3	4	3.5	3.5
Package contents								
Bundled Software	✘	✘	✘	FlashMail,Passid, PCLock, SecretZip	Automail, Magicdisk, PCLock, SecureZip, Password Protection utility	DataSheriff	✘	✘
Accessories	Neckstrap, USB cable	Neckstrap, USB cable	Neckstrap, USB cable	Neckstrap, USB cable	Neckstrap, USB cable	Neckstrap, USB cable	✘	✘
PERFORMANCE (70%)								
Documentation (Y/N)								
Quickstart guide	✔	✔	✔	✔	✔	✔	✘	✘
Manual	on CD	on CD	on CD	on CD	✘	on CD	✘	✘
Sisoft Sandra 2003 Professional Drive Benchmark								
Drive Index	907	868	919	877	686	674	945	941
Sequential Read (KBps)	960	928	973	926	892	887	970	988
Random Read (KBps)	958	925	967	924	508	477	967	982
Sequential Write (KBps)	698	637	714	686	539	564	853	762
Random Write (KBps)	700	628	716	680	378	360	850	766
HDTach								
Random Access Time (in msecs)	6	6	6	6	6	68.5	6	6
Average read speed (MBps)	1	1	1	1	1	1	1	1
Average write speed (MBps)	1	1	1	1	0.1	0.1	1	1
Read Burst speed (MBps)	1	1	1	1	0.9	0.9	1	1
CPU utilisation (%age)	0.1	0	0.1	0	0	0	0	0
Real-world tests: File Transfer Tests (seconds)								
Sequential Read (20 MBps)	4.2	7.57	7.14	9.27	8.15	6.34	9.67	8.3
Assorted Read (20 MBps)	25.35	24.17	34.37	24.67	43.69	24.67	23.54	23.45
Sequential Write (20 MBpsec)	34.47	33.87	30.66	36.16	40.29	36.16	29.01	30.66
Assorted Write (20 MBps)	65.64	63.58	55.21	55.29	117.29	55.29	44.17	55.21
Maximum capacity transfer test (in MBps)								
Sequential Read (Max capacity) (MBps)	1.34	1.28	0.93	1.56	1.20	1.21	1.41	2.30
Assorted Read (Max capacity) (MBps)	1.13	1.72	1.23	1.18	0.73	1.09	1.77	1.26
Sequential Write (Max Capacity) (MBps)	0.65	0.61	0.69	0.71	0.51	0.53	0.72	0.74
Assorted Write (Max capacity) (MBps)	0.52	0.43	0.57	0.52	0.36	0.38	0.57	0.62
Cost per MB	50.00	36.69	29.44	28.69	72.58	44.35	40.32	30.24
OVERALL SCORE								
Features	20.5	20.5	10.5	12	8.6	22.7	3.5	3.5
Performance	45.17	44.23	55.56	55.61	40.16	34.94	49.33	47.65
Overall Score (Performance+Features)	65.67	64.73	66.06	67.61	48.76	57.64	52.83	51.15
Value for Money (in Rs)	1.31	1.76	2.24	2.36	0.67	1.30	1.31	1.69
Grade	C+	C+	B	B	C	C	C+	B
Price (Rs)	1,550	2,275	3,650	3,500	2,250	2,750	2,500	3,750

Value for money

Unlike the USB thumb drives comparison, where the actual cost per MB was very high, the large storage capacities of the external hard drive ensure that the cost per MB stays low. While evaluating the Value for Money quotient, we didn't just consider the cost per MB, but also took into account the general performance of each thumb drive.

The Iomega drives sped ahead of the others, powered by their highly economical costs of 13 paise and 14 paise per MB for the 120 GB and 80 GB drives, respectively. They also scored respectably in the benchmarks and tests. In the smaller 4,200-rpm drive VFM-battle, the most cost-effective drive was the Transcend 40 GB drive—not suprising since it cost only 29 paise for MB.

Conclusion

Finally, after all our tests, we saw that although the so-called desktop hard drives had a seemingly unfair advantage with their greater speeds, the slower drives still managed to perform well in the real-world tests. The eventual winner was the 7,200-

USB - THUMB DRIVES

	Princeton MPDUSB256MB	Princeton MPDUSB512MB	Touchmate TM-USB256	Transcend TS128MJFLASHA	Transcend TS256MJFLASHA	Transcend TS512MJFLASHA
	59x18x10	69x19x9	80x22x15	75x25x11	75x25x11	88x33x15
	8	11	14	15	15	24
	256	512	256	128	256	512
	Keychain	Keychain	Clip	Keychain	Keychain	Keychain
	Data transfer	Data transfer	Power and data transfer	Power and data transfer	Power and data transfer	Power and data transfer
	USB 1.1	USB 1.1	USB 1.1	USB 1.1	USB 1.1	USB 1.1
	✗	✗	✓	✓	✓	✓
	3.5	3.5	3.5	3.5	3.5	3.5
	3.5	3.5	4	4	4	4
	✗	✗	UFD utility	mFormat, Passid	mFormat, Passid	mFormat, Passid
	✗	✗	Neckstrap, USB cable	Neckstrap, USB cable	Neckstrap USB cable	Neckstrap USB cable
	✗	✗	✓	✓	✓	✓
	✗	✗	on CD	on CD	on CD	on CD
	897	924	944	873	742	727
	927	971	967	926	922	922
	919	970	966	924	569	531
	858	739	853	665	672	665
	685	740	854	666	462	433
	6	6	6.2	6	52.2	59.8
	1	1	1	1	1	1
	1	1	0.1	0.1	0.8	1
	0.9	1	1	1	1	1
	0	1	0.6	0	0	1.2
	7.42	1.83	8.51	11.94	8.28	1.43
	30.21	34.47	27.74	35.51	24.37	26.2
	24.98	29.69	31.37	33.8	32.3	32.08
	49.36	53.88	59.2	72.43	68.2	68.33
	1.19	0.98	1.13	2.06	1.15	0.95
	0.97	0.97	0.90	1.11	0.93	1.15
	0.89	0.73	0.73	0.64	0.65	0.64
	0.85	0.71	0.77	0.50	0.69	0.61
	25.10	27.05	24.19	24.39	20.24	18.22
	3.5	3.5	17.7	21.7	21.7	19.7
	48.68	46.48	42.91	39.27	40.92	40.72
	52.18	49.98	60.61	60.97	62.62	60.42
	2.08	1.85	2.51	2.50	3.09	3.32
	B+	B+	B+	B+	A-	A-
	6,250	13,500	6,000	3,000	5,000	9,000

rpm 40 GB FHD-1 drive from Freecom which proved its mettle to walk away with the Best Performance award.

The Best Value award was given to the Iomega 120 GB hard drive, considering its rich bundle of utilities, decent performance and low cost per MB. Amid the portable external drives, the Transcend 40 GB drive deserves a special mention, taking into account its high scores in the real-world tests, and the added convenience of its leather carry-case.

ANIL GANGOLLI
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1/2 pg V AD

PHOTOGRAPH: Mexy Xavier IMAGING : Mahesh Benkar

Own your e-mail

Owning your mail server simplifies the chaos that is mail management for small businesses, not to mention make you look more professional. We tested eight of them to see how far they can go towards helping you and your organisation get that business look!

People with small businesses may not have favourable views on the law, but they certainly love order. However, more often that not, one of the most important aspects of business—networking and managing contacts—is ignored, when a simple e-mail solution could work wonders for your business. After all, a free uncustomised e-mail ID is not only boring, it also does not send positive signals to clients.

Perhaps it's time for an e-mail server to bring order and method to the messages flowing in and out of your organisation, as well as those circulating internally. Adding to that, the e-mail ID will have your company's name attached to it, and approaching new clients and retaining old ones becomes much simpler than before.

The biggest advantage of an e-mail server is that the server goes online at specified intervals, and you need not have it connected to the Internet all day. This saves valuable Internet time, and therefore, money.

We take you through eight such solutions to help you decide what's best for your organisation.

CommuniGate Pro

Highly shielded

A brief dilemma awaits after you smoothly install CommuniGate Pro—you don't know how to configure the server since there are no entries made in the Start menu, while the documentation states that the admin interface runs on port 8010.

Getting to know the username and password for the admin interface is a bit troublesome. You have to browse through the documentation for a file named account.settings. By default, the 'postmaster' account acts as the administrator account. You need to enter the administrator password for each and every module, which can be irritating.

CommuniGate Pro supports flow control, i.e., it restricts a user to a maximum number of messages that he or she can send and receive in a pre-determined time. These are user-defined values.

It lacks a remote dialler, and features such as auto-archiving and auto-carbon copying. It also cannot assign user-priority and restrict

How We Tested

We tested e-mail server software to see how well they could serve a SoHo organisation that typically has around 25 nodes with traffic of around 200 to 500 e-mails per day. Here, performance was not a big issue, but bundled features played an important role. We didn't put a premium on performance, because it depends on factors such as the ISP, bandwidth, ISP traffic, time of day (peak/off-peak time), and traffic on the external server. These factors never remain constant.

We used a Sify dial-up account. Prior to the test, we loaded our test systems with Windows XP and kept a Norton Ghost image handy. A couple of e-mail IDs with test e-mails were set up.

A backup e-mail ID had a duplicate set of these so that when the server downloads an e-mail without the 'Leave on Server' feature, you can transfer the test e-mails back, and test the next server software.

One e-mail ID held nine e-mails, some of which had attachments. The other e-mail ID held all the 22 virus test messages. Here, we used an external mail server that did not have anti-virus software installed.

Another pre-requisite was that a DNS MX record, consisting of a domain name and its associated IP address, had to be created on the local DNS server. The DNS entry pointed the domain to the IP address of the server. For these tests, the domain was ***mailtest.jdm.co.in*** and the IP address was ***192.168.0.1***.

Performance

The performance tests comprised the speed test, the virus test and the flooding test.

The speed test and virus test downloaded e-mails from a server on the Internet to our local server. The speed test consisted of the downloading of a set of nine e-mails that amounted to 11 MB; Eight of them had attachments sized 2 MB.

In the virus test, we downloaded 22 e-mails, each with an EICAR virus string in a different format. The mail server software might not detect all the viruses, though it might catch all of the infected e-mails. However, if it does not detect at least a few, then it's not quite a secure fortress.

Lastly, the flooding test determined the stability of the e-mail server under heavy load. We pumped in 1,000 e-mails to the SMTP port, and checked whether it crashed. It didn't; rather, it stopped responding to new connections after accepting a certain number of messages. We noted down this number.

During testing, we installed each new software after restoring the image of the primary partition. We then configured the server to download e-mails for the speed test, and noted down the time taken. Next, we configured it to download virus-infected e-mails, and noted down the number of viruses caught by the anti-virus. Finally, we stressed the SMTP server with the flooding test.

Features

The features we looked for were divided into three categories: basic e-mailing, interface, and security.

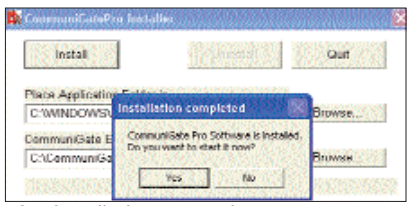
The basic e-mailing category included features such as downloading of mails from an external server via POP3, forwarding, archiving, sorting, auto-carbon copy and auto-reply.

The interface category comprised features such as prioritising users, specifying user quota and support for multiple domains, multiple users, multiple aliases, and multiple mailing lists. It's a must for an e-mail software to provide the administrator with rights to restrict the maximum message size. These days, most software come with browser-based mail and admin interfaces, so these are also important. An inbuilt dialler reduces the trouble of setting up and integrating a Windows dialler, and eases the scheduling process. These features, too, were included in this category, and we checked whether the software had them.

The security category included features such as integrated anti-virus and anti-spam support. Here, we checked whether the software used a hostname-based, as well as IP-based screening method to restrict unauthorised users. We also verified whether the SMTP server supported features such as relay ON/OFF, SMTP authentication and POP3-before-SMTP. Lastly, we checked for Secure Socket Layer (SSL) support.

We also checked for ease of use depending on how intuitive and user-friendly the software was.

the message size. Support for anti-virus and anti-spam is missing. It also lacks SSL support and hostname-based screening.



After installation, ComuniGatePro prompts the user to start the server

You might find climbing a Himalayan mountain easier than uninstalling CommuniGate Pro! It doesn't pack in an uninstaller, nor does Windows provide a method to uninstall it.

In sum, CommuniGate Pro has all the features a typical system administrator would like to have at hand for a SoHo environment, but finding your way about might take some time.

Price: NA
Web site:
www.stalker.com/CommuniGatePro

\+ Flow control
– No remote dialler; no uninstall facility

CommuniGate Pro	B+
Performance	
Features	
Ease of use	

IMail Express

Online always

As compared to CommuniGate Pro, IMail takes longer to install as it configures the domain for the server, helps you to create accounts on the server, lets you enable or disable servers that should start by default when Windows boots up, and sets the default relay option for the SMTP server. It even installs the default SSL key. It also creates the LDAP database, which can't be skipped.


During installation, IMail lists the servers that are present, while the user has to select the ones that should start

The downside for a dial-up user: IMail can-

not download e-mails from an external server. Hence, the absence of a dialler does not make much of a difference from the SoHo user's perspective. IMail comes in useful for organisations that have a 24-hour Internet connection as well as a static IP address.

IMail also cannot sort and archive e-mails automatically. With support for just a single domain, it only permits 10 users to be created. On the security front, it lacks features such as anti-virus, host-based screening and POP3-before-SMTP.

The server performed extremely well in the flood test. It accepted all messages at one go, without deferring incoming connections, even though a reviewer accidentally caused the flood test script to execute seven times—which meant 7,000 messages bombarding the IMail server. We skipped the speed and virus tests, since the server lacks the downloading feature.

IMail bundles along additional servers such as LDAP, Calendaring, Whois, etc. It also has a client to help users read e-mails from the IMail server. The server has a browser-based interface that includes admin as well as e-mailing options. Only authorised users can view the admin section.

Overall, IMail is a server that does its job well when used with a dedicated Internet connection. Though free for use with 10 users, it's of no use to those with a dial-up connection.

Price: Free (10 users)
Web site: www.ipswitch.com/products/imail_server

+ Outperformed the rest in the flood test
– Downloading e-mails not possible

CommuniGate Pro	A-
Performance	
Features	
Ease of use	

Kerio MailServer 5.7.4

Almost famous...

Kerio MailServer is similar to products such as Kerio Personal Firewall—it starts work immediately upon installation.

In the basic e-mailing category, it lacks important features such as auto-reply and carbon-copy. There's no remote dialler. User screening based on host-name is absent. It also could not assignpriority to users. There's no inbuilt anti-virus support, however, you can use any anti-virus software with Kerio as long as its present on the system before you install Kerio.

Kerio's login screen lets you monitor the Web server as well as the Kerio mail server

Kerio lets you monitor the mail server installed at a remote location using its IP address or domain name. Its ability to restrict remote administration only from certain IP addresses is remarkable. In doing so, it further enhances the security of the server.

Another useful feature is creating and storing templates for different types of employee such as customer care executives, accountants, managers, clerks, etc. Thus, you can have templates specifying the settings for the inbox of copy editors, reviewers, etc.

Apart from a conventional interface, Kerio has a browser-based mail interface that shows deleted messages using strike-out lines. These pretend to be absent from the inbox when queried through telnet on the POP3 port. The messages are deleted only if you click the Expunge button.

Interestingly, this server lacked the 'Leave on Server' feature while downloading e-mails from the external mail server. Hence, you cannot download the same e-mail to two different locations.

To our surprise, the anti-spam feature detected all the 1,000 test messages that we pumped in the flooding test as spam; it's pretty intelligent.

Overall, we found Kerio quite simple to use. It was nearly on par with its contenders in the performance rating. However, it lagged behind due to the lack of a few features.

Price: US$ 395 (20 users)
Web site: ww.kerio.com/kms_home.html

+ Deleted messages appear in strike-out font; user templates
– Lacks host-based screening and integrated anti-virus; no 'Leave on Server' feature

Kerio MailServer 5.7.4	A-
Performance	
Features	
Ease of use	

MDaemon

A good daemon

MDaemon differs from CommuniGate Pro in its installation—installation and configuration is through a six-step wizard. This helps the user set up the domain, as well as start the server immediately.

MDaemon has two administrative modes—one for normal users, and another for the advanced, experienced user

The plus point of the installation is that it compulsorily sets up the domain so that the server gets on with its work. However, it does not detect Windows DNS settings automatically, and asks for it through an input screen.

For a change, this software does not have a browser-based admin interface. Having a real application to manage can be a relief for a system administrator—at the very least, he or she knows whether or not the application is responding. The conventional interface is neatly arranged and grouped into Tools, Stats, Servers, Queued mail, etc.

The greatest advantage is that it provides a status of what's running and what's not. Though the browser-based admin interface is not installed by default, you can do it anytime from within the provided interface.

By default, the anti-virus and LDAP modules are not installed. You need to purchase them separately. The trial pack that we used didn't have these modules. However, MDaemon has an in-built mechanism that tests the mail server using the EICAR test after installing the anti-virus. EICAR (***http://www.eicar.org***) is a globally recognised test. It is used to check whether the anti-virus software is deployed correctly.

Surprisingly, by default, SSL is turned off. So you need to

manually start the SSL service and create an SSL certificate. Though it scored a zero in the virus test due to the lack of an anti-virus, it did well in the rest, especially in the speed and flood tests.

The software had all the minimal features we were looking for in all categories—the basic e-mailing, security and interface categories—and it scored an ace in each one of them!

Price: US$110 (six users)
Web site: www.altn.com/products/ default.asp? catalog%5Fname= Products&category%5Fname= Software&product %5Fid=MDaemon

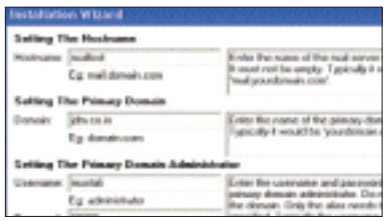
+ Inbuilt EICAR test for anti-virus
– Web admin not installed by default

MDaemon	A-
Performance	
Features	
Ease of use	

Merak Mail Lite 7.0.1

Our software of choice

A mail server that detects 14 out of the 22 infected e-mails in the virus test has to have some substance. The initial configuration is a simple, single-step process, where you need to specify a hostname, domain name, administrator username and an administrator password.



Configure the domain name while installing Merak Mail

Merak Mail Lite has a conventional application-based interface that is quite similar to the browser-based admin interface. It had all the features we were looking for. Even if it did not have an inbuilt dialler, it integrated well with the one that comes with Windows. This software allows you to set size limits to data sent by a user, and the maximum number of messages sent by him or her per day. These little features help in maintaining decent manageable mail traffic on the Intranet.

It sends mails based on their waiting time in the queue. Using this feature, you can specify the maximum amount of time a messages sits in the SMTP queue, before it dials out and goes on its way.

A new security technique, 'deny telnet access', does not allow a person to write to any server port using telnet.

Meanwhile, Merak Mail Lite excelled in identifying spam. It treated the first message in the 1,000-message flooding test as a regular e-mail, but marked the rest as spam.

Merak Mail Lite shows the amount of actual data transfer taking place in KB or MB. A system administrator can use this as an indicator to find out whether the software is actually working. The software bundles along goodies in the form of a calendaring server and an instant messaging server.

Thanks to this great mix of features, performance and ease of use, this software comes out tops. Merak Mail Lite 7.0.1 is definitely our recommendation.

Price: US$99
Web site: www.icewarp.com/Products/ Merak_Email_Server_Software

+ Deny telnet access; integrated anti-virus; mail sending based on waiting time
– No inbuilt dialler

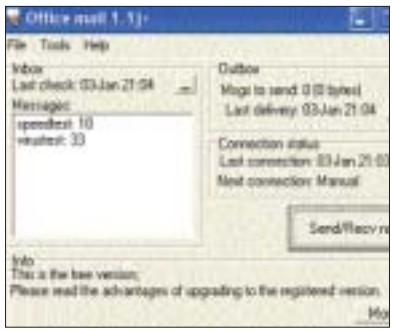
Merak Mail Lite 7.0.1	A
Performance	
Features	
Ease of use	

Office Mail 1.1j+

Light, very light

Office Mail is a mail server that provides just basic stuff such as downloading, storing and forwarding. It doesn't even act as a domain mail server.

It lost heavily on features. In the interface category, it just has one feature to boast about—the ability to create users. Anti-virus support, IP-based screening and SMTP authentication are the only features in the security category.



Office Mail shows the precise status of the POP3 and SMTP servers in a single window

You have to specify each and every e-mail ID, messages to be downloaded from an external mail server. These IDs can be from any domain. Similarly, you can specify another list of e-mail IDs, messages for which should arrive through the SMTP port, and be stored locally on the server. All e-mails, except for those specified on the list, will be forwarded to the external SMTP server. Messages pertaining to e-mail IDs in the list are stored in the corresponding local inboxes.

In performance, Office Mail is as good as Merak Mail and MDaemon. However, it doesn't allow multiple connections simultaneously, and hence slows down when the SMTP server is overloaded. Nevertheless, it did not defer incoming e-mails at any time, accepting the entire bulk in one go.

The big plus is that it's extremely light on system resources. With just two servers, POP3 and SMTP, Office Mail is a good product for a very small organisation, especially since its free.

Price: Free
Web site: www.burrotech.com/office-mail.php

+ Light on resources; only two servers
– Lacks several features

Office Mail 1.1j+	B
Performance	
Features	
Ease of use	

Know Thy Domain!

Use the 'whois' service provided by Accredited Registrar Web sites such as ***www. godaddy.com*** to check for contact information associated with your domain. Normally, it's implemented using a textbox and a button. If the domain isn't in your name, then call the company that registered your domain, and set it right.

There have been instances where a middleman registers the domain for the client, and then keeps the ownership rights to some other company. If this happens, you hardly stand a chance of acquiring those rights again.

Most domain registration companies issue an administrator username and password. Use these to log in to a Web-based interface to manage domain details such as contact information, domain name server settings and password modification.

Postmaster

Good and bad

Like the others, Postmaster has a simple installation procedure. It has a single-step configuration wizard that asks for the domain name, POP3 settings for the external mail server and the external SMTP server.

The console screen for Postmaster shows what the server's been doing

Barring the first START/STOP button, the text on the rest of the buttons on the Console page is unreadable.

A good feature is the remote dialler, which, in the presence of settings such as time-based and queue scheduling, does an exceedingly good job. While time-based scheduling is quite common, the queue-based feature lets you specify the number of e-mails in the queue, after which the dialler dials out and forwards the messages to the external SMTP server.

The maximum size restriction can be different for incoming and outgoing mails. In the case of outgoing mails, those sent on a local network can have an unlimited size, while the rest can be filtered to a user-defined maximum size.

Postmaster bundles along an anti-virus and an anti-spam solution. On the security front, it screens hosts based on IP addresses, and not on hostnames. It lacks SSL support and a feature to create mailing lists.

This software can also act as a proxy server for the local network, thus eliminating the need for a third-party proxy server.

A negative, though: at times, you do not know what's happening in the software. The logs are not updated immediately, which may lead you to assume that the software is not functioning. In such a situation, the monitor can be helpful. However, finding it is another hassle, since the button that opens its window has unreadable text. By default, logging is disabled for most of the operations. You'll have to browse through the different sections and enable logging where needed.

Features-wise, Postmaster has nothing much to crow about. Its performance too was lacklustre. However, a point to be noted is that Postmaster has an extensive local network of distributors.This though is a small thing in its favour.

Price: Rs 4,500 (six users)
Web site: http://postmaster.co.in/

\+ Remote dialler
– Lacks screening based on host names; button text unreadable

Postmaster	B+
Performance	
Features	
Ease of use	

qmail

Linux's Mr Popular

You need lots of patience to install qmail and get it to work, even though there's a lot of online help to assist you. One such Web site is ***http://lifewithqmail.org***. qmail is commonly used with Linux, and most system administrators managing Linux servers are sure to have worked with qmail at some point.

Changing Hosts

A word of caution: Changing the Hosting Service Provider (HSP) takes around 48 hours or more. While this happens, you might not be able to receive e-mails or access them. Relax! This is normal. You might even lose some messages during the process. Therefore, don't change your service provider frequently. Make that decision once and for all. However, if at all you ever need to switch providers, prepare yourself in advance for the oncoming trouble.

It can't download POP3 messages from an external mail server automatically, nor can it auto-sort mailboxes. It lacks a remote dialler as well. Additionally, you'll need to configure a program—fetchmail—to be able to download messages, since qmail lacks this functionality. However, features such as auto-reply, user-wise quota, a Web-based interface, anti-virus, anti-spam, SMTP authentication and POP3-before-SMTP that are not present by default can be installed for free, with downloadable patches.

Its biggest advantage is that it's free, and light—it comprises just a POP3 and SMTP server. The functionalities needed for today's mail server can be added with the help of third-party patches that you can download from Web sites such as ***http://qmail.org***.

Price: Free
Web site: http://qmail.org

\+ Lots of free add-ons and documentation
– Lacks many inbuilt features; installation tests your patience

qmail	B+
Performance	
Features	
Ease of use	

Conclusion

Despite the uncertainty in the testing environment, the average download speed was in the range of 36 Kbps to 39 Kbps. Performance-wise, the speed test saw values ranging from 33 minutes to 37 minutes while downloading messages that were nearly 11 MB in size, which was more or less similar across the board.

In the virus test, only Merak Mail showed positive results, detecting 14 out of the 22 virus messages. Others either did not have integrated anti-virus support, or weren't able to detect them.

These software accepted all messages in the flood test, but over varying time frames. IMail and Office Mail accepted all of them at one go, though IMail was a bit faster. Following them were Merak Mail (991), MDaemon (696) and PostMaster (337). The bracketed values indicate the messages accepted in a single stretch, after which they deferred the newer connection for some time.

A cost-effective solution would naturally be free software! Examples are Office Mail, qmail, IMail (for 10 users) and SurgeMail (for 5 users). If your system administrator can handle a Linux server, there's nothing like qmail—lots of goodies for free! However, it takes ages to install and configure. Windows users should opt for Office Mail, which is simple, easy to configure and very light on system resources.

Finally, we had a few good performers—CommuniGate Pro, MDaemon, PostMaster, Kerio Mail and Merak Mail—that catered to the vast majority that uses a dial-up connection. The race was closely competed, but eventually, only MDaemon and Merak Mail came out with a 100 per cent score in the features section. Choosing between these two was difficult—even the 'Ease of Use' factor was unable to bring up a winner.

Ultimately, it was the virus test that gave Merak Mail the edge over MDaemon, and our recommendation award.

Decision Maker

	Cost-effective solution	SoHo with a dedicated Internet connection	SoHo with a dial-up connection
You need	A decent performing mail server software to help you get started with e-mailing solutions with minimal cost	A software that accepts or sends e-mails outside the organisation, and also supports e-mail transfer within the organisation	A software with the capability to download e-mails from, or send them at regular intervals to, an external server
Look for	Basic features such as downloading mails, as well as forwarding mails to an external server	Security features such as anti-virus and the ability to prevent unauthorised users from connecting to the server	Downloading as well as security features such as anti-virus, screening of computers, etc
Our pick	qmail for Linux, Office Mail for Windows	qmail for Linux, IMail for Windows	Merak Mail
Price	Free	qmail: Free; IMail for Windows: Free for 10 users	US$99 (Rs 4,950 approx.)

Setting up a Mail Solution

SCENARIO 1: You need to provide an e-mail solution that allows employees to send, as well as receive e-mails, only within your organisation. In this case, you just have to install any of the nine server software, and you're done. You can specify any domain name, even something like microsoft.com, intel.com, etc., as long as you don't want to send and receive e-mails to and from outside the organisation. Configure the user accounts on the server, and then configure the SMTP server to sort the incoming mails to the respective inboxes. Finally, for all the e-mail clients, configure settings for the POP3 and SMTP servers such that they use the IP address of the mail server.

SCENARIO 2: You need to provide a solution that allows employees to send and receive e-mails from outside the organisation as well. For this, you need a domain name such as ***www.mycompany.com*** or ***www.mycompany.co.in***, so that you have a global presence. Here's how you go about doing this:

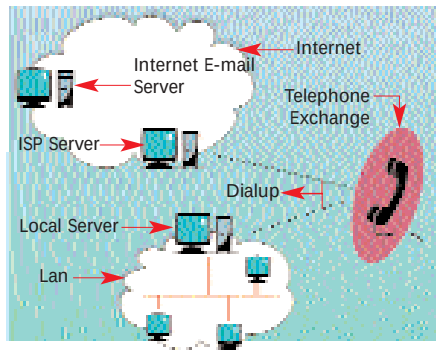
STEP 1 First, check whether the domain name of your choice is open for registration. You can view the status for any top level domain such as .com, .org, .net, .info, .biz and .name on any of the registrar's Web sites, such as netsol.com, whois.net, register.com, etc. All '.in' domains, where .in represents India, are registered with NCST, India at ***http://ncst.ernet.in***.

Just type in the domain name in the appropriate box and click on the search option. In case the domain's registered, it displays the contact details of its current owner. If it's not, then register it manually with the help of a company. If it's already registered, then either choose a new name, or wait for the current holder to release the domain. You can even offer to buy the domain rights from the current holder.

Possible domain name options are mycompany.org, mycompany.net, mycompany.biz and mycompany.info. An even better domain would be something like mycompany.co.in, where '.co.in' indicates that the company is registered in India.

STEP 2 Register your domain name either online, or with the help of a local vendor. If you decide to register online, remember to have your credit card handy.

Web sites such as BulkRegister.com and Register.com, etc. are appointed as Accredited Registrars for the United States. USA itself has a lot of companies that are authorised to accept domain registrations. The entire registrar list is available at ***http://www.internic.net/origin.html***. India has its own set of accredited registrars too—directi.com and Signdomains.com, for instance.



Registering a domain name for a year via the Web costs you anywhere in the range from Rs 700 to Rs 1,700, after dollar conversion, while registering the same with the help of a local vendor may amount to something as low as Rs 400.

STEP 3 You now need to buy a domain-hosting package. This involves buying space on an Intenet e-mail server (IES) that's always connected to the Internet. This way, a storage space marked with your domain name stays online all the time.

There are several hosting companies providing such facilities. Each vendor has a set of systems connected to the Internet 24x7. These companies link the IES to the domain name.

STEP 4 This is when you set up the DNS servers to link the domain name and the IES. Most domain hosting companies provide mailing solutions as part of the hosting package. So, if you buy a hosting plan, you get a certain number of mailboxes on the IES.

Some companies provide a separate space for each mailbox. Some provide a single chunk of space, which the user can custom-divide amongst the mailboxes. These companies also provide a control panel to manage your Web site. This helps you create, modify, delete users, manage databases, view site statistics, protect the directory, etc. Here, too, we're restricting ourselves to features needed to enable mailing solutions.

STEP 5 Next, create users with the help of the control panel. Depending on the number of mailboxes provided (usually between 5 and 20), create all the user accounts on the

CATEGORY		DOMAIN HOSTING PLANS					
	Name	Cyquator	Net4Domains	e-Totalsolutions	Cenvo Hosting	Cybersitesindia	Compyter Village India
	Web site	www.cyquator.com	www.net4domains.com	www.etotalsolutions.net	www.cenvo.com	www.cybersitesindia.com	www.cvindia.biz
FEATURES	OS choice	Windows, Linux	Windows, Linux	Windows, Linux	Windows, Linux	Windows	Windows, Linux
	Database Support	All *	MS SQL,Ms Access	All *	All *	All *	All *
	Control Panel	✔	✔	✔	✔	✔	✔
	Webmail	✔	✔	✔	✔	✔	✔
	Domain Registration Choice (ccTLD/gTLD)	gTLD	gTLD	Both	Both	Both	Both
	Support	Phone/E-mail	Phone/E-mail	Phone/E-mail	Phone/E-mail	Phone/E-mail	Phone/E-mail
PRICE	Domain Registration -gTLD (in Rs)	600	495-510	500	350-400	369	99
	Windows Server (Rs)	3500	850	2000	500	850	1650
	Linux Server (Rs)	3500	650	1800	400	NA	900
	Extra for database	NA	2000	NA	NA	NA	600-2000
	Web Space (MB)	10	2	10	10	5+20	10+30
	POP3 Email ID/alises	10	1	5	20	2	3
	Auto Responders	Unlimited	NA	1	Unlimited	✔	Unlimited
	Mail Forwarding	Unlimited	Unlimited	Unlimited	Unlimited	✔	Unlimited
	Mailbox	10	1	5	20	2	3
	Data transfer (MB/Month)	500	Unlimited	100	1 GB/Month	150	NA
	Price Per MB (in Rs)						
	Windows Server	350	425	200	50	34	41.25
	Linux Server	350	325	180	40	NA	22.5

** MS SQL, MS Access & MySql, ccTLD—Country Code Top-Level Domain, gTLD—Generic Top Level Domain*

IES if the employees in your company are fewer than the number of mailboxes. Use them wisely. However, if employees outnumber mailboxes, just create a single 'catch all' account. A 'catch all' account is a master account that accepts messages for all e-mails IDs, even those meant for non-existent user accounts. Hence, you need not worry if you have fewer mailboxes.

However, if you select software that does not provide a sorting facility, you need to create similar accounts on the IES and the local mail server. You also have to manually configure each account on the local server to fetch mails from a similar account on the IES.

The advantage of having a single account on the IES is that you don't have to manage users on two servers simultaneously. On the other hand, separate accounts on the IES lets the user check his or her e-mail directly from the IES, with the help of the provided mail interface—very convenient for those on the move.

Once the IES is ready with the necessary user accounts, people all over the world can start sending messages to your domain.

STEP 6 Now, set up a computer in your organisation as a mail server to fetch e-mails from the IES, and distribute them among employees. Use a mail server software for this. Choose one that has features such as remote POP and scheduling. The local mail server should also have a dial-up Internet connection.

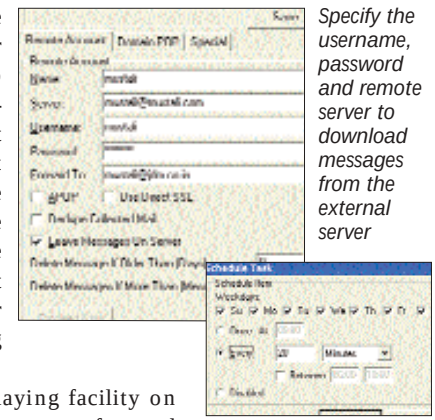
STEP 7 Specify the registered domain name while installing or configuring the software.

STEP 8 Create user accounts for employees on this mail server. You can make them as you please—name@company.com, or name.lastname@companyname.com in case you have two people with the same firstname.

STEP 9 Messages received are stored on the IES under a 'catch all' account. Configure the mail server software to download these e-mails from this remote POP account, and then distribute them amongst the different user accounts.

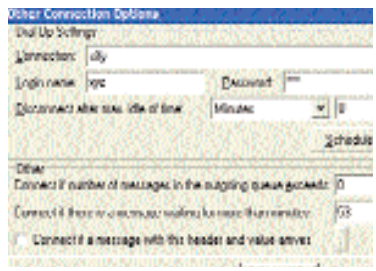
STEP 10 Next, configure the scheduling capabilities of the mail server so that it connects to the Internet at regular interval, for example, every hour.

STEP 11 Configure the SMTP server on the mail server to handle outgoing messages. By default, it forwards e-mails that need to go outside the organisation to the SMTP server on the IES. It should also sort and locally deliver messages pertaining to your own domain.



Specify the username, password and remote server to download messages from the external server

STEP 12 Enable the relaying facility on the SMTP server to forward e-mails. This may involve clicking an option box or checkbox.



Select the dial-up connection, specify the username and password, and specify the intervals at which the dialler should connect

Once the above installation and configuration is complete, you're done with the server configurations.

STEP 13 Now, configure the e-mail client software such as Outlook, Eudora, etc. on the local nodes, with the POP3 server and SMTP server as the IP address of the local mail server.

STEP 14 Finally, if you have problems with the delivery of messages locally, insert an MX record for the domain on your local DNS server. The MX record pair consists of the domain name, such as mycompany.co.in, and the IP address of the local mail server, such as 192.168.0.1.

That's it—happy mailing!

MUSTALI KACHWALA
mustali_kachwala@thinkdigit.com

Bazaar

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

Acer Ferrari 3000

Think red

The Ferrari 3000 has a bright red lid, and sports the distinct yellow Ferrari logo on the bottom-right corner and a silver Acer logo embossed in the centre. The base and the inside panel are done in metallic silver, with another Ferrari logo on the bottom panel. The red and silver dual-tone finish makes it the most distinctive looking notebook you can lay your hands on. A red optical USB mouse, also sporting a Ferrari logo, is bundled.

The keyboard is recessed into the base, but is tactile and a breeze to use. The touchpad is very smooth and integrates a steel finished four-way scroll key. There are four launch keys that control the browser, the e-mail client and the other two are user programmable.

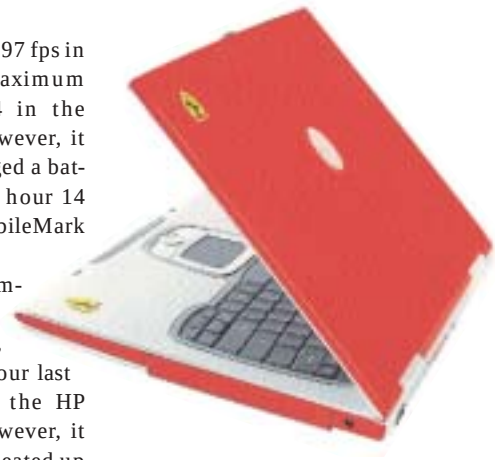
The Ferrari comes pre-loaded with Windows XP Home Edition. Apart from the recovery CD, the bundled software packages include Acer Launch Manager, Norton AntiVirus, CyberLink PowerDVD and NTI CD-Maker.

In terms of pure CPU performance, it logged a score of 27.1 in Business Winstone 2002 and 114 seconds in the video encoding test, coming a close second in these tests after the ACi Optima that we tested last month. The 128 MB ATi Mobility Radeon 9200 outdid all the other contenders, with scores of 97 fps in *Quake III Arena* at maximum resolution and 5,854 in the 3DMark 2001 SE. However, it ran out of gas and logged a battery life of a measly 1 hour 14 minutes in the MobileMark 2002 test.

With good performance and top scores in features and usability, the Ferrari 3000 beat our last performance winner, the HP Compaq nx9000. However, it has a tendency to get heated up quickly, especially while watching a movie or playing a game.

The Ferrari 3000 is all about making a statement. If you are a Ferrari fan, this device is for you. When you go out to buy a Ferrari, value for money is the last thing on your mind. At Rs 1,60,000, it's a notebook with extreme flaunt value.

Price: Rs 1,60,000
Contact: Acer India Pvt Ltd
Phone: 080-5219520
Fax: 080-5219535
E-mail: ailenquiries@acer.co.in
Web site: www.acer.co.in



SPECIFICATIONS

Dimensions: 330 (W) x 272 (D) x 31 (H) mm, weight: 2.93 Kg, AMD Athlon XP-M 2500+, 15-inch TFT LCD, ATi Mobility Radeon 9200, 60 GB hard disk space, DVD-Writer, integrated 10/100 Mbps Fast Ethernet, Bluetooth button, 4 USB 2.0 ports, IEEE 1394 port, S-Video TV-Out, infra-red port

Acer Ferrari 3000	C-
Performance	
Features	
Usability	
Value for money	

Xplore iX104 Tablet PC

The SUV of tablets

The iX104 conforms to US military environmental standards. It houses a patented rubber bumper system, a proprietary thermal management system and a shock-isolated hard drive. It can withstand being dropped from about 3 feet.

Weighing just over 2 Kg, it's quite bulky. You can switch the device to standby, remove the 4500 mAh battery and plug in a charged one. It sports a five-directional rubber joystick and a stylus that snaps into the rear of the device. In terms of performance and features, it's close to the Toshiba Portege 3500 Tablet PC.

The Rs 2,50,000 price tag restricts it to those that require such ruggedness in a device.

Price: Rs 2,50,000
Contact: Dynalog India Ltd
Phone: 022-25181900
E-mail: tghosh@dynalogindia.com
Web site: www.xploretech.com

SPECIFICATIONS

866 MHz mobile Intel Pentium III processor, 256 MB SDRAM, 10.4-inch LCD display, 40 GB hard drive, USB 2.0 port, Ethernet (RJ-45), IEEE 1394 Firewire port, internal type I/II PCMCIA slot, internal mini-PCI slot

Xplore iX104 Tablet PC	C
Performance	
Features	
Usability	
Value for money	

Adobe Photoshop CS

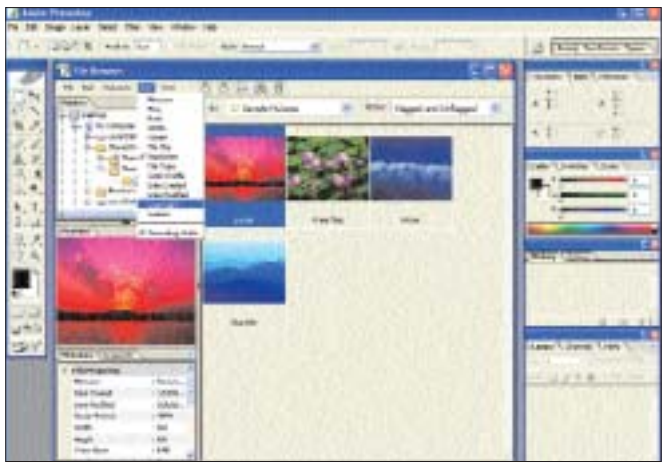
Worth the upgrade

Adobe's Photoshop, considered the *de-facto* image editing software in the market, is now equipped with a set of features that makes it even more productive.

"One of the most useful additions to this latest version is the Filter Gallery. This allows the user to preview all the built-in filters in a new window, and apply multiple filters in one go. I have used this feature and found it quite useful and time-saving", says G V Sreekumar, Assistant Professor at the Industrial Design Centre, Indian Institute of Technology, Mumbai. The filter gallery is useful for beginners not familiar with each filter in Photoshop. Instead of trying out each filter and then pressing undo, one can see the effect of each filter clearly in the gallery.

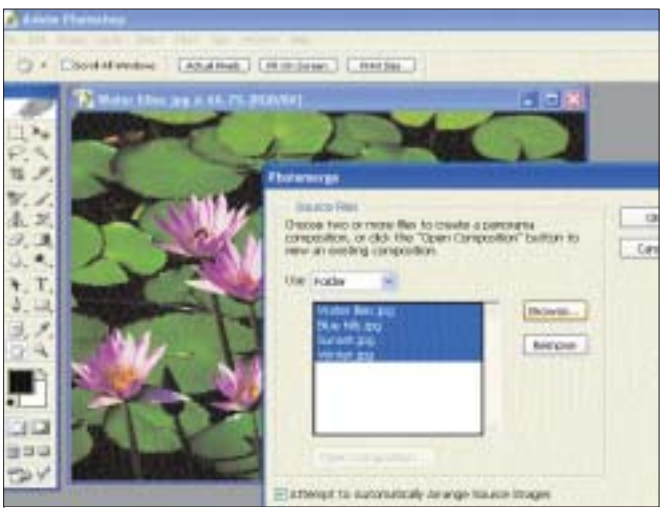
A floating palette shows histogram information. During colour correction, the histogram palette shows the existing levels and new levels superimposed on each other. This gives a good idea about the extent of correction being applied by the user.

The file browser is improved, and the image preview quality is better. The interface of the file browser is also improved—it's getting closer and closer to that of image utilities such as ACDSee. It allows you not only to preview, tag and sort images, but also to edit and search with keywords and metadata. Even the History log can be saved as metadata. You can protect your work by adding copyright information directly in the file metadata. Another addition is the ability to share batches of files right from the file browser. A new tool called the Color Replacement brush is a combination of a brush with the colour option, instead of normal or dissolve. This tool allows you to change the colour of any area of the image while retaining the original texture and shading.



The file browser image previews are much better than the earlier versions

The filter gallery shows previews of different effects that can be applied



Use more two or more images from the Photomerge menu to create a panorama

Under the Adjust menu, one can correct the shadow and highlight areas of an image, a time-saving feature useful for photographers and pre-press professionals.

PhotoShop CS allows you to manipulate text, and it still keeps the text editable. For example, you can wrap text around a path, apply distortions and edit text afterwards. This is a welcome addition to designers who use text extensively in Photoshop. "I had been waiting for this a long time", says Pratik Shah, a digital imaging professional.

Every designer uses layers in Photoshop. Now you can group layers into nested layer setups, which can contain up to five layers.

Inbuilt scripting allows you to save multiple layers to individual files. Live monitoring of the histogram allows digital imaging artists can now view a live display of composite, as well as individual channels, simultaneously.

Others frills are the Photomerge feature, the Lens Blur effect that actually simulates real-world visual blurring phenomena, the capability to automatically crop multiple scanned images into individual documents, and a preset document size for designing videos or DVDs.

However, "Photoshop's image distortion is still not as good as Adobe Illustrator, where you can edit an image by adding and stretching nodes", feels Ram, an illustrator with the *Times of India*.

Overall, there are a sizeable number of enhancements, which do justify the upgrade.

Price: Rs 33,600
Contact: Adobe Systems India
Phone: 0120-2444711
E-mail: sandeep@adobe.com
Web site: www.adobe.com

SYSTEM REQUIREMENTS

Pentium III or 4, Windows 2000 with SP 3 or Windows XP, 192 MB of RAM, 280 MB hard disk space, 1024 x 768 or greater monitor resolution

Adobe Photoshop CS	A-
Performance	
Features	
Ease of use	
Value for money	

Canon A80 Digital Camera

All's well that shoots well

The A80 is a 4.0 megapixel camera with an LCD screen, which can be rotated 270 degrees, so you can view the subject while shooting from odd positions. The camera has a 3X optical zoom, and can achieve a total zoom of 11X when coupled with the digital zoom. It also produces colour excellently and picks up fine details precisely, even indoors, thus making it a good choice for industrial photography.

The flash bundled with the camera works perfectly at close distances. Images can be a maxiumum of around 1.7 MB in size depending on the frame. Hence, you can store up to 30 images on a 32 MB Compact Flash card.

Price: Rs 34,995
Contact: Canon India Pvt Ltd
Phone: 011-26806572
E-mail: Shyam@canon.co.in
Web site: www.canon.com

The A80 runs on four AA batteries that ran out faster than we anticipated. Canon has designed it for both, amateurs and professionals. The mode dial has predefined modes such as Aperture priority, Shutter priority, Night scene mode, etc., and two custom setup modes that can be configured and saved for different scenarios.

Its easy-to-use interface has text display for each feature, but the icons are colourless and tiny. Considering its features and performance, it is worth every *paisa*.

SPECIFICATIONS

4.0 megapixel, 3X optical zoom, 5.7X digital zoom, 5-cm macro focus, 15 to 1/2000 second shutter speed, ISO 50 to 400, seven white balance settings, PictBridge ready

Canon A80 Digital Camera	B+
Performance	
Features	
Ease of use	
Value for money	

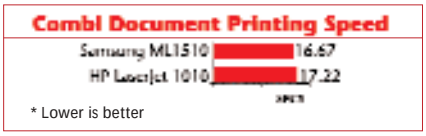
HP Laserjet 1010 Laser Printer

Windows please, OK!

The Laserjet 1010 is Hewlett-Packard's latest 101x series printer, targeted at the ultra low-end laser printing segment. The 1010 is almost identical to the 1015 Laserjet—it features the same mixed bluish grey and white shaded body.

Its (37 x 23 x 20.8 cms) dimensions make it suitable for a cramped office desk. Also, weighing just under 6 Kgs, it's more portable than most laser printers. The 1010 has a small paper input tray, with a limited capacity of 150 sheets. The top of the printer acts as the output tray with the help of a small detachable flap. The 1010 lacks a protective plastic cover for the paper input tray.

The 1010 has a simple and hassle-free installation. The printer controls, located on the top of the printer, also reflect this simplicity with two buttons, and three indicator LEDs to indicate the operational status. The printer is only compatible with Windows operating systems. The package includes a driver CD, a power cord, the printer cartridge and a setup guide. A USB cord is not provided.



In our tests, the 1010 performed better than the 1015, both in terms of speed and quality of printed output. However, the test image showed prominent banding across the sheet. On the other hand, the printed text was clear and sharp.

At Rs 11,000, the Laserjet 1010 is a good printing solution for the home and SOHO segment.

SPECIFICATIONS

600x600 dpi resolution, USB 1.1 interface, Media supported: A4 sheets, envelopes, card labels, transparencies

Price: Rs 10,999
Contact: Hewlett Packard India Ltd
Phone: 0124-2566111
Fax: 0124-2566112
E-mail: seema.dawar@hp.com
Web site: www.hp.com/in

HP Laserjet 1010 Laser Printer	B+
Perfromance	
Features	
Build quality	
Value for money	

LiteOn LDW-811S DVD Writer

Performance personified

The LDW-811S is the latest dual-format DVD-Writer from LiteOn.

We couldn't carry out the tests on DVD-RW media, as they aren't available in the market yet; we tested with 2.4X media. The assorted media write test took 21 minutes, and the single data file write test took 23 minutes. In the DVD-R data writing tests, the drive took 55 minutes to write 4.5 GB of assorted data.

The DVD+R/RW consortium have fixed a standard for dual-layered DVD+R media for public consumption. The DVD-R consortium have also arrived at a standard for dual-layered DVD media, and these should be available world-wide by around May-June 2004. Now that these standards have been fixed, purchasing an 8X DVD burner makes sense.

The LDW-811S can't write on dual-layered media, but according to the drive manufacturers, this can be taken care of by a firmware upgrade. This drive is a good purchase, since it's priced at an affordable Rs 13,750.

SPECIFICATIONS

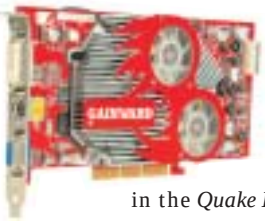
Dual-format DVD-Writer, supports DVD±R/RW and CD-R/RW, speeds: CD-R: 40X, CD-RW: 24X, DVD: +R 8X, -R 4X, +RW 4X, -RW 2X

Price: Rs 13,750
Contact: Mediatech India
Phone: 022-56396696
E-mail: sales@mediatechindia.com
Web site: www.liteonit.com

LiteOn LDW-811S DVD Writer	A-
Performance	
Features	
Build quality	
Value for money	

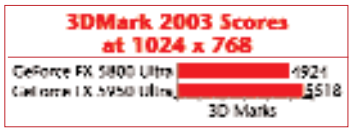
Gainward GeForce FX 5950 Golden Sample

Pushing the limit



The 5950 runs at a core clock speed of 475 MHz, and a memory speed of 950 MHz. Two fans are put on the heat sink. The card gets overclocked to 485 and 975 MHz automatically when the supplied software is installed. For testing, we used the latest Forceware 53.03 drivers from nVidia. The 5950 posted a whopping 5518 at a resolution of 1024 x 768 in the 3DMark 2003 test. At high resolution, the 5800 Ultra and the 5900 Ultra lost out to the 5950 by a large margin in the *Quake III* test.

The card did pack a punch, but it's an overpriced avatar of the 5900 with the same core technology.



Price: Rs 34,975
Contact: Mediatech India
Phone: 022-56396696
E-mail: sales@mediatechindia.com
Web site: www.gainward.com

SPECIFICATIONS

256-bit architecture, 475 MHz clock, 0.13 micron fabrication, AGP 8X, 128-bit 256 MB 950 MHz DDR video RAM, 400 MHz RAMDAC, max resolution of 2048 x 1536 at 85 Hz

Gainward GeForce FX 5950 Golden Sample	B+
Performance	
Features	
Build quality	
Value for money	

Microsoft Natural Multimedia Keyboard

Type naturally

This keyboard has its keys placed on a gentle sloping surface for your fingers and palm to rest. The reorganised keys need getting used to, and there's no Insert key.

It provides 24 additional keys for use with various Microsoft applications. Function keys act as shortcut keys to Cut, Copy, etc. Toggle between function keys and the alternate function using the [F-lock] key. The top-lined buttons are media-centric along with Internet shortcut keys such as Mail, Messenger, etc. You also have buttons for calculator, Log Off and Sleep.

You can reassign the keys to open your favourite applications. However, the function keys don't remember what you set them to, which is very irritating! A notification pops up near the system clock every time you use the Caps Lock, Num Lock or Scroll keys.

At Rs 3,020, it's definitely expensive. However, do bear in mind that no other company comes close to manufacturing keyboards of such quality and near-perfect ergonomics.

Price: Rs 3,020
Contact: Microsoft Corporation India Pvt Ltd
Phone: 011-26294600
E-mail: connect@microsoft.com
Web site: www.microsoft.com/india

SYSTEM REQUIREMENTS

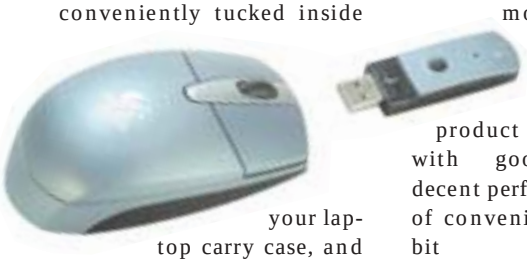
Pentium 133 MHz or higher, 35 MB hard drive space, CD-ROM drive, compatible with all Windows operating systems

Microsoft Natural Multimedia Keyboard	B
Performance	
Features	
Ergonomics	
Value for money	

Logitech Cordless Optical Mouse for Notebooks

Is that a mouse in your pocket?

This cordless optical mouse from Logitech is designed specifically for use with notebooks. The metallic grey body with a black base and a silver Logitech logo on top is small enough to be conveniently tucked inside your laptop carry case, and just the right size to be used comfortably.



The package includes a small USB Radio Frequency (RF) receiver and a neat carry pouch that has a small pocket for the said receiver. Other package contents are the MouseWare software on CD, an installation guide and two AA batteries.

The mouse is ambi-dextrous in design. However, if you have large hands, you should try it before you buy it. The mouse is detected immediately in Windows XP after plugging the RF receiver into an available USB port. The scroll wheel is extremely smooth and precise. However, it was over-sensitive in *Quake III*—even lowering the mouse sensitivity didn't help much.

Though the product offers cool looks with good ergonomics, decent performance and a lot of convenience, Rs 2,700 a bit too high, and may put off prospective buyers.

SPECIFICATIONS

RF mouse, optical sensing technology, USB RF receiver, ergonomic design for right and left-handed users, two AA batteries included

Logitech Cordless Optical Mouse for Notebooks	C
Performance	
Features	
Ergonomics	
Value for money	

Price: Rs 2,700
Contact: Logitech Far East Ltd
Phone: 022-24905149
Fax: 022-24904145
E-mail: response@logitech.com
Web site: www.logitech.com

Antec SLK2600AMB Super Mini Tower Cabinet

Good things come in small cases

The Antec SLK2600AMB Super Mini Tower cabinet has a sleek metallic exterior. It's spacious, with a 300 W power supply. Ample room is provided for airflow, with a fan cage on the back and on the front. The four 3.5-inch bays can hold two external drives and two internal ones—four 5.25-inch drive bays are more than enough for all your DVD and CD burners.

The power supply has an onboard temperature sensor, and as the temperature increases, the fan goes faster. The cabinet features a screwless design for the 5.25-inch drives. The rear panel cover hides the back panels of add-on cards. The USB ports are in the front.

Overall, the cabinet design comes across as aesthetic, but there are sharp edges inside the case. The finish isn't perfect, and an extra fan on the back would have been appreciated.

With other branded cabinets retailing for much lower, the SLK2600AMB will only appeal to those who've got money to spare.

Price: Rs 5,250
Contact: Cyber Space Abacus Pvt Ltd
Phone: 044-24917667
Fax: 044-52154188
E-mail: antec@theitdepot.com
Web site: www.antec.com

SPECIFICATIONS

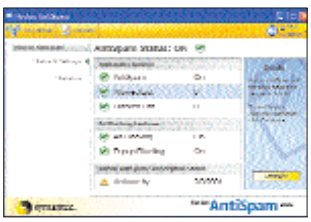
Mini tower, Athlon and P4-compliant power supply, 300 W power rating, 2 front-mounted USB ports, voltage selector (110/220 V)

Antec SLK2600AMB Super Mini Tower Cabinet	B
Ease of use	
Features	
Build quality	
Value for money	

Norton AntiSpam 2004

Keep spam at bay

Norton AntiSpam 2004 (NAS) integrates with most POP3-based e-mail clients such as Microsoft Outlook, Eudora, etc, incorporating a toolbar that adds anti-spam functionality.



Norton AntiSpam's interface is similar to its AntiVirus, hence making it easy to configure

During installation, NAS tries to automatically import names from your address book, and adds these to the 'allowed' list, thereby treating them as 'not spam'. We installed NAS on Eudora, as well as on Microsoft Outlook 2003, which has anti-spam capabilities. NAS detected more spam on the first go than Outlook did. It did miss out on a few, though.

Symantec claims to have incorporated an intelligent filtering engine that figures out which e-mail is spam by analysing outgoing messages.

NAS can also block ads, by looking at the places where advertisers commonly position them, and also at the size of the pop-up.

McAfee's SpamKiller lets you report the source of the spam to the administrator; NAS doesn't. It has the Live Update feature, which is a plus. It also come with the product activation feature as well.

NAS is good, but if you're using Outlook 2003, it is not worth the money for the few extra spam mails it catches.

Price: Rs 2,295
Contact: Tech Pacific
Phone: 022-55960238
E-mail: jitendra@techpacindia.com
Web site: www.symantec.com

SYSTEM REQUIREMENTS

300 MHz or higher processor, 128 MB of RAM, DVD or CD ROM, Internet Explorer 5.5

Norton AntiSpam 2004	A-
Performance	
Features	
Ease of use	
Value for money	

IMAGING: Solomon Lewis

Web sites that you can change from within your browser? Here's how...

Wiki Wiki Web: everyone's invited!

We've all seen Web sites with typos, incorrect grammar and just plain bad taste. Wouldn't you just love to fix all that you thought was wrong? Wouldn't it be great if every time you went to a Web site and found a '404 link', you could just create that page? Well, you can! No, not on every Web site you see, but on the Wiki Wiki Web.

What is the Wiki Wiki Web? No, it's not slang for the World Wide Web, *wiki wiki* is actually Hawaiian for 'quick'. The Wiki Wiki Web was developed in 1995 by Ward Cunningham, who was going to call it Quick-Web, until he saw a bus called the Wiki Wiki Bus outside a Hawaiian airport. Ward's Wiki, or the Portland Pattern Repository Wiki, began as an interactive Web site for finding software development patterns, wherein any programmer could post his views or code that others could modify. Gradually, Ward's Wiki spawned many clones, and the Wiki community grew. The idea that one could change or improve what they saw—just by using their browser, was irresistible.

Wiki's uniqueness lies in its simplicity. For instance, to create a page all you need to do is string together two or more words into any page you edit. So, to create a page called 'My Page', just edit the text of any page, add in the word 'MyPage' (without a space; capitalisation is important) and click Save. This automatically creates a page called MyPage, which you can now begin to edit.

To add a page Called *My Page*, just type in My Page?. Click on the ? to edit and thus create My Page?

Wiki is so easy to use, you can create pages without knowing any languages such as HTML

So, even those with no knowledge of HTML, or experience of building Web sites, can re-format, add and delete pages. The program was written to be simple enough for a six-year old imp to a 60-year old grandpa to do everything on a Wiki.

Surprisingly, not many know about Wiki, though it has been around since 1995. Commonly asked questions are: Why? What's the point? How can it survive? How do you stop cyber vandals from destroying it?

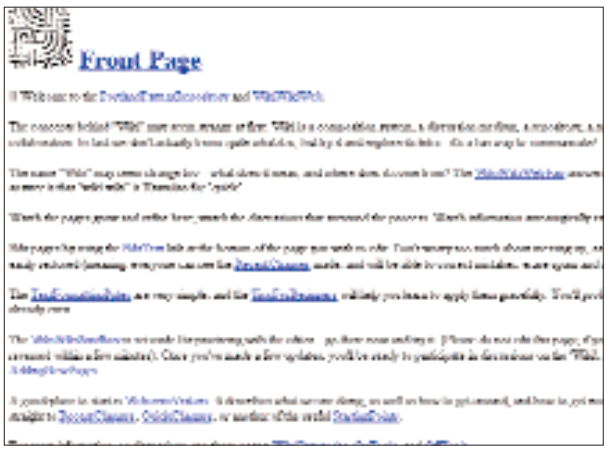
Though it's normally sane to explain how something works before explaining why it works, Wiki is an exception to the rule; most people want to know, why it works, especially when anyone can delete, add, change, morph, mangle, etc., at will?

WikiWorks

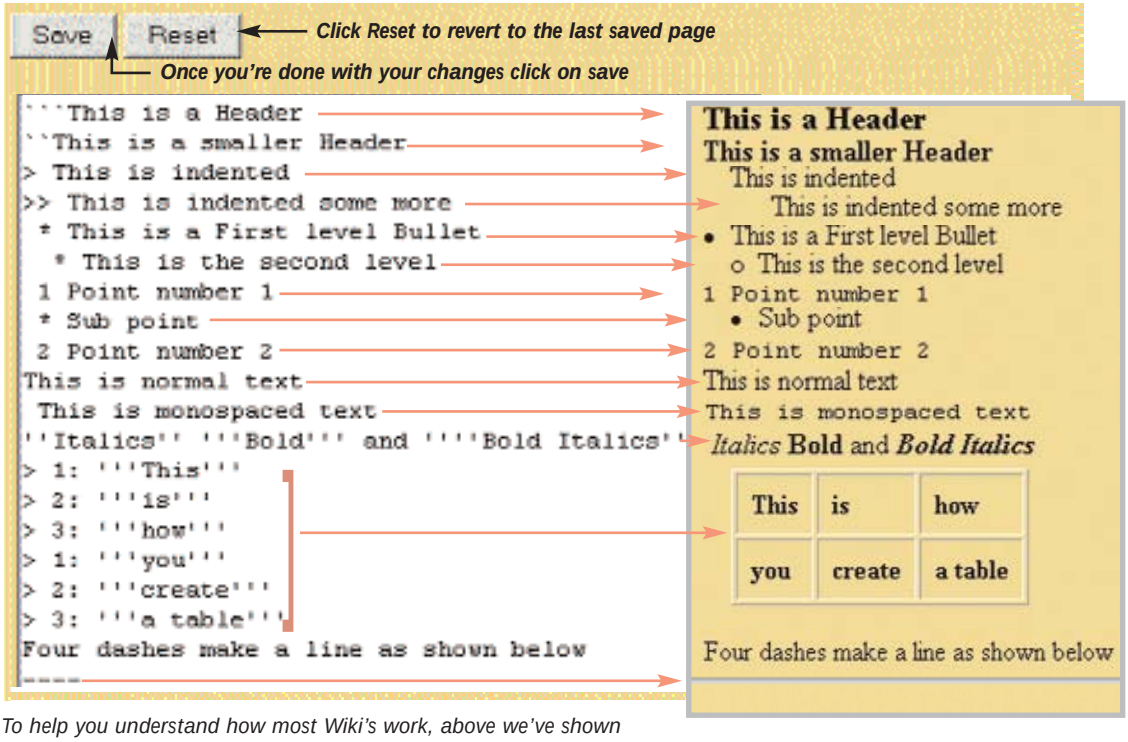
A Wiki is designed to give everyone a voice—whether it's a literary duel, or just a discussion about the weather. No matter what stand you take on what issue, as long as you're polite and make a valid point, no one will delete what you put up. Deleting a Wiki page, or even another author's content is just not done.

However, there are some bad apples to be sorted out. Once you become a Wikizen, you'll realise that those there for positive purposes, far outnumber the few odd vandals. Wiki's weaknesses are, in fact, its strengths. The very fact that anyone can edit any page can be a weakness—anyone can come along, and destroy a page with insults and expletives. However, these offences can be remedied almost instantaneously—by deleting or re-wording. Another boon is the Wiki ideology; sure it's fun to hack, crack, or any other 'ack' a place of high security, but what's the point in defacing a place that invites you with open arms?

Wikizens may give you a million reasons, but its existence since 1995 is conclusive proof of why a Wiki works.


Front Page

The first page of a Wiki is generally called Front Page or Start Page. These generally link to common pages such as Recent Changes, Welcome Visitors and the SandBox



To help you understand how most Wiki's work, above we've shown the text box that you get when you click on the EditPage link, or 'Edit the text of this page' link on a Wiki page. On the right we've shown how the page is displayed once you click save. Look closely and you'll understand exactly what Wiki syntax is. It's easy really, just use a Wiki's SandBox page to experiment

UsingWiki

Wiki integrates with a Web server to serve pages, as well as allow users to create and modify pages. These servers work in three different modes: The first, allows anyone to edit pages; the second, only allows authors selected by the site administrator to edit a page, but everyone can view the pages; the third allows everyone to see the Wiki, but only a few of its pages can be modified by selected authors. Needless to say, Wikizens believe that these protected Wikis just aren't Wiki anymore.

Most Wikis have a few things in common though:

The StartPage: The first page states the philosophy of that particular Wiki, and has links to other important pages such as the RecentChanges and WikiFormatting pages. It is also called Front Page on some Wikis.

The WikiFormatting page: Also known as the HowTo page, WikiSyntax page, etc. These are tutorials on using the Wiki syntax while editing or adding a page. Make sure you go through this page at every Wiki you visit, or else you're likely to commit a few bloopers. Though most Wikis use the general formatting discussed in this article, there are some with minor differences.

The RecentChanges page: This is generated by the server and cannot be edited. It keeps everyone posted about who changed what, and when. The Wikizens of a particular Wiki will often be on the lookout here for 'impolite' behaviour.

The RecentChanges page is how Wiki owners keep track of all the changes that people make. Every time a page is modified, it is listed on the RecentChanges page.

The EditPage link: Also called EditText, EditTextOfThisPage, etc. When you click on it, you are shown a box containing all the text of that page—with the formatting (single quotes, tabs, etc.)—all you have to do is add or delete text, add the style of formatting you want, and click Save.

The FindPages or Search link: This takes you to a search page where you can search by page, or by content.

That's about all you need to see on a Wiki. After seeing these pages, if you want to create a new page, edit an existing page, add a link to your page, etc.; go ahead and do just that!

WikiFarms

So you want to start your own Wiki, but have no place to host it... don't worry, the thoughtful Wiki community has even that covered. There are places called Wiki farms that encourage and nurture all that is Wiki. Some are free and others charge standard Web hosting charges.

Two free Wiki farms are SeedWiki ***(www.seedwiki.com)*** and Swiki ***(www.swiki.net)***. Both use formatting that is different from classic Wiki, but all your pages can be edited by anyone

SeedWiki uses the WYSIWYG method of editing, which gives you the option of editing a page using ActiveEdit control (MS Word style interface), a Java Applet, an HTML Editor, or plain text. However, you need a paid account to be able to upload documents and images.

Swiki needs you to sign up for an account, after which you can start creating your Wiki. you can upload documents and images, and get 25 MB of space for them.

The Sandbox is a good place to start if you're not sure of Wiki syntax. This is one page where it's OK to make mistakes

WikiEtiquette

- Never use smileys or IM terms such as LOL, etc. Wikizens consider themselves a cultured bunch, and using slang makes them think you're an inferior species.
- Think three thousand five hundred and eighty-six times before you edit a page and add your thoughts. Chances are that a few minutes or hours after you edit a page, there will be someone or the other scrutinising your work and trying to find a typo. That's just the way it is!
- Try not to intervene in a topic or discussion you know nothing about.
- Try to use a Wiki's SandBox page and experiment there with the formatting before you actually start editing—this can save you a lot of embarrassment later.
- Never delete what's written, unless it's on a page you created and isn't of importance anymore.
- Creating pages that are out of topic on a Wiki is considered WikiSquatting—another form of rude behaviour. For example, on a Wiki dedicated to programming, creating a page dedicated to Metallica is sure to get a few verbal
- Don't create a personal Web site on a Wiki, or advertise yours unnecessarily. This is acceptable only if your Web site has something meaningful and pertinent to say. Commercial use of a Wiki's features is discourteous, and such pages are likely to be deleted pretty quickly.

RunnningWikis

Adding a page, or modifying one on someone else's Wiki is the easiest way to get started, but advanced users—and those with their own Web servers—can set up their own Wiki. Even companies can set up a Wiki to provide an online version of a bulletin board, databases inside a corporate LAN that can be updated on the fly, research documents, etc. Those with large families can set up a family Wiki as an entertaining method of communication and keeping in touch; rather than the mundane e-mail, snail-mail, or the IM. The possibilities are endless, and Wiki could be as addictive as IRC, or IM chatting.

There are hundreds of Wiki clones, and choosing one can be a tedious exercise. There are those that require integration with Web server software such as Apache, while others contain an inbuilt server. Then there's the problem of choosing one that's optimised for your operating system. All in all, finding the best Wiki server software can be a daunting task, resulting in hours of reading feature sets. Since all the fun of a Wiki lies in using it, and not setting it up, we decided to be lazy and look for the easiest and fastest to set up Wiki software. Our search led us to WikiServer that is a newbie's delight. Download the 141 Kilobyte file from ***http://www.tinyted.net/eddie/wiki/***, unzip it, double-click on the .EXE file, open Internet Explorer and navigate to ***http://localhost/***, or ***http://127.0.0.1/***. Now, you can configure your Wiki using only your browser. The server runs as an MS-DOS window, so as long as it's open, it is running.

Those interested in advanced complex servers that support ASP, Java, Perl, CGI, etc., can check out the really long list of Wiki engines at ***http://www.c2.com/cgi/wiki?WikiEngines***. Here, you can search for the one that best suits the programming language, or the operating system you are working with.

WikiServer is by far the easiest Wiki HTTP server available. Just double-click the EXE file, point your browser to ***http://localhost*** *and start creating your very own Wiki.*

AWikiWikiEnd

Whether it's for fun, intellectual discourse, meeting people, discussing ideas, or just to blow your own trumpet, you're sure to find a Wiki that you can fit right into. Even if you don't, you can always start one. Wiki is growing in popularity, and is here to stay. Between all the hot air, stuffiness, holier-than-thou attitudes and intellectual braggarts, you're sure to find a few buddies. Sure, you'll make enemies and friends, have a few verbal fisticuffs and squabbles, but overall you're sure to leave with a better vocabulary, higher sense of understanding... and two black eyes. Next time, fling a copy of Webster's dictionary at your assailant's head!

ROBERT SOVEREIGN-SMITH
robert_smith@thinkdigit.com

Sites to visit

http://c2.com/cgi/wiki: Created by Ward Cunningham, the Portland Pattern Repository was the first ever Wiki. It was started as a place to share programming code, thoughts and to find patterns in programming.

www.greencheese.org: This crazy Wiki wants to figure out what our grandparents meant when they told us, "The moon is made of green cheese!" It has a username and password login system, but anyone can sign up to use this Wiki.

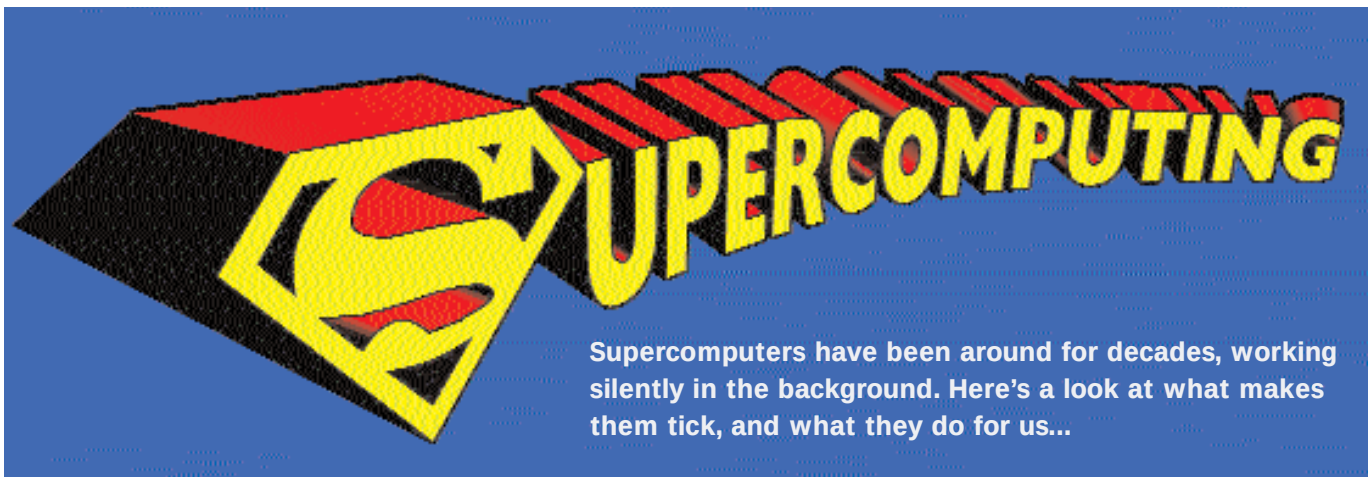
http://en.wikipedia.org/: Wikipedia is a popular online encyclopaedia. The best thing is that in true Wiki style, anyone can add, change, or delete the definitions mentioned here. Try the 'Random Page' link for a laugh—it displays a definition of a term, chosen at random.

http://www.usemod.com/cgi-bin/mb.pl: MeatBall Wiki aims to be an online meta-community—a common meeting place for the online community.

https://musircd.dagur.com/phpwiki/: Visit this Wiki to learn or teach people about IRC and IRC Daemons—mostly Linux based daemons such as Hybrid and MusIRCD.

Big Iron is what industry insiders call a supercomputer. We lesser mortals perceive them as massive number crunching monsters, housed in huge metallic cabinets and located in eerie blue-tinged rooms, in tightly controlled environments, spitting out bits by the billion—actually, supercomputers are mostly just that! Supercomputing can be more accurately defined as High Performance Computing (HPC). HPC covers a broad plane of various architectures and tools, used in solving large, complex and computation-intensive problems.

A lot of supercomputing's earlier history can be traced back to the late Seymour R. Cray, founder of what is now called Cray Inc., the foremost supercomputing designers of our times. He is known as the 'father of supercomputing', having founded Cray Research in 1972, after working with the CDC (Control Data Corporation), designing equipment for scientific computing. Cray's machines were the first (and the fastest) supercomputers of their time. They were designed to work on problems that were unsolvable, or computationally too tough for ordinary computers. Cray Inc, along with NEC, IBM, HP, SGI and others, make high performance supercomputers that have found new customers in industry-level research and development.



GRAPHIC DESIGNER: Parag Joshi

Not for your desktop

The architecture of a supercomputer is significantly different from that of a desktop machine. It is designed to handle large volumes of data, and to do tedious calculations. Supercomputing architectures have multiple processing nodes to handle parallel computing, whereas desktop processors typically work with a few instructions within a clock cycle, using a technique known as pipelining.

Traditional supercomputers work on problems where several complex variables need to be analysed simultaneously; these problems may not be easy to break down into tiny, more easily analysable parts that could be worked upon in parallel. They involve large data sets and hence computers solving these problems need to have access to large shared memory spaces. The access itself has to be rapid, so that the computation process is not slowed down due to lack of data. Specialised processors and memory access technologies, with features to speed up specific types of calculations, solves that problem.

Another form of supercomputing is clustering. Clusters can be built by ganging up commonly used computers through a high-speed network. Of course, this is a rather simplistic way of defining these giants. Cluster-based HPC machines do not need to have access to a shared or common memory resource. Instead, the problems are broken up into tinier, parallelisable components. Within the cluster, each computer or node, has its own OS and memory. Each node works on a subsection of a problem that it can compute on its own—with minimal interaction of other nodes. This has become so popular that clusters are being adopted widely. However, computing clusters perform well only with obviously parallel problems, where data is easily broken up. There are still classes of problem that only traditional supercomputers can do. India's C-DAC's (Centre for Development of Advanced Computing) new Param Padma supercomputer is an example of a powerful supercomputing cluster, as is their older Param 10000.

Traditional HPC machines are specifically designed to increase performance, with optimised hardware and software. Based on the way instructions and data are manipulated, today's supercomputers can be classified as Multiple Input, Multiple Data (MIMD) machines. Single-processor MIMD machines can handle multiple streams of instructions and data streams. Multiple-processor MIMD machines are extremely efficient, as they run many subtasks in parallel. All this translates to a faster solution for the main task. Of course, MIMD is a broad classification and there are further sub-classifications depending on the memory organisation and access methodology—whether shared or distributed:

Shared Memory MIMD (SM-MIMD): Within the shared memory approach, each of the multiple CPUs share the same memory address space. The entire memory can hence be accessed by all the CPUs, making it easier to program applications. However, there are also a couple of disadvantages to shared memory. One is memory contention, which occurs when two or more CPUs compete to access the same data and modify it. The problem grows in proportion with the number of processors, which is why there is a limit to the number of processors in SM-MIMD machines. Another problem is the technique by which the memory, as well as the CPUs are connected to each other. Ideally, the bandwidth of the memory should increase linearly, and processors should

be able to communicate with each other. In practice though, interconnecting processors can prove to be prohibitively expensive; various interconnect structures have been proposed and adopted. They vary from crossbar connections to data bus-style connections. Again, the interconnect structures limit the number of processors, especially with an increase in processor speeds.

Distributed Memory MIMD (DM-MIMD): In this sort of memory organisation, each processor has its own memory. Processors are connected by a high-speed network switch that allows for data exchange between their respective memory locations. To use DM-MIMD, the user has to explicitly distribute data across various processors, and then arrange for data exchange between them—unlike the SM-MIMD architecture, which allows for transparent memory addressing across all processors. However, this is amongst the fastest growing class of HPC machines today, and with good reason—within current standards, this should outperform all others. DM-MIMD machines have no crippling memory bandwidth problems, or restrictions on the number of processors.

DM-MIMD machines also have their disadvantages—communications between processors are much slower than in SM-MIMD systems. In computations that require frequent data exchange and synchronisation between processors, performance may be below par.

Cache Coherent Non-Uniform Memory Access Machines (ccNUMA): This forms a part of a growing trend in designing supercomputing machines. Systems built on this approach usually have a small number of processors tightly integrated or clustered into a Symmetric Multi-Processing (SMP) node. The processors within the nodes are connected by a swift crossbar interconnect, and those clusters are then connected by high speed network cabling. ccNUMA lets the SMP nodes share their memory—all the memory in the system is addressed globally. This means that a data item may not be located in physical memory, but may be within one logical shared address space—data is physically distributed over several nodes. Since the memory is globally addressed, it's important to keep consistency in the data values throughout—thus the name 'cache coherent'. All caches ensure that the values of variables held by them are coherent and consistent. Several supercomputers in the world are ccNUMA machines, such as the SGI Origin3000 series and the HP Superdome.

India's Big Iron, at CDAC's Bangalore supercomputing facility: Seen here (white and red), the CDAC-developed Param Padma supercomputing cluster
In front (black): A Sun UltraSPARC high performance computing machine

Super processors

Looking into the past, supercomputers used rather expensive proprietary processors; today's supercomputers use a wide variety of processors, from RISC processors such as those from HP's PA-RISC and Alpha families, to the better-known AMD Opteron, and the Intel Itanium and Pentium series.

RISC processors: RISC processors are inherently different from the more common-place CISC processors. They were, and still are, preferred—even with lower

Questions You Always Wanted Answered

How does a supercomputer bootup?
You kick it with your boot! The same as a normal computer, except that most of them are server-level machines. All you do is turn on the power.

Can I *Quake* on a supercomputer?
Only *Quake XI* at 6,500,000 fps! Seriously, no. High performance machines work only with UNIX or its clones, though HP SuperDome does run a variety of Windows. Now all you need is the requisite hardware and drivers, not to mention support for *Quake*.

I have two computers and an empty closet. Can I rig up a ccNUMA machine?
No! You need a lot more money, lethal hardware, about 2,000 sq ft of enclosed space with air-conditioning, several miles of cabling and some serious technical guidance.

My new Pentium 4 packs more punch than a CRAY XMP... I have super computing power, don't I?
Dream on! Comparing a decade old supercomputer to your 3-month old PC isn't quite right. Both work great, but work best for the applications they were designed for.

So I can't have my own supercomputer?
Sure you can, for Rs 30,00,00,000 only! What you can do is set up your own cluster, and simulate a cluster supercomputer.

Would that work?
Maybe. The only true chance you have of seeing a supercomputer in action is if you come up with a problem that will convince scientists to let you use some precious supercomputing time.

Where can I see a supercomputer?
If you ever find out, let us know too!

Actually, they're not that rare anymore. From processing financial transactions and simulating crash testing, to researching new cures in medicine, supercomputers are used the world over. Now all you need to do is get a job or break into one of the facilities that house one. Best of luck!

Not your desktop machine—the HP SuperDome HPC machine

clock cycles, RISC processors deliver over two 64-bit floating point results within a single clock cycle. They also have out-of-order instruction execution and a larger processor-to-memory bandwidth. All of these make the various RISC-based processors very attractive. The ASCI Q is housed at the Los Alamos National Laboratory, New Mexico, USA. It uses 4,096 EV-68 Alpha processors, each running at 1.25 MHz. ASCI Q is currently ranked as the world's second fastest supercomputer. IBM's processors also rank pretty high up this list, with ASCI White (ranked fourth) running on Power 3 processors, as well as Seaborg (ranked fifth) that runs on the Power 3+ processors.

Vector processors: Vector processors are a unique class of processors that work on entire vectors within a single instruction. Many intensive engineering and mathematical computational tasks require operations to be carried out on various elements of data. To solve such problems efficiently, vector processors were developed that can directly manipulate entire vectors of data. A vector processor executes fewer instructions, but manipulates an entire matrix or array of data in parallel.

For calculations that depend on working and sifting through large datasets, vector processors can be specialised to extract maximum performance; however, they are more expensive to design and produce. Today's HPC machine designers tend to use off-the-shelf RISC chips. Still, vector processors form a niche category and are certainly not phased out yet. Cray, for instance, is continuing work on its next generation vector processor; the SV-2; Japanese electronics giant NEC is doing so too.

NEC designed the fastest supercomputer of today—the Earth Simulator—made up of 5,120 vector CPUs. AMD and Intel are also very much in the reckoning, even as they come out with their 64-bit CPUs. HP has whole-heartedly adopted the Itanium 2 in their newer Superdome series, and so have SGI and NEC. The 32-bit Pentium 4 has already been enthusiastically welcomed by the cluster community. With its higher clock frequency, the 64-bit AMD Opteron is now being considered for SMP-style clusters.

Super software

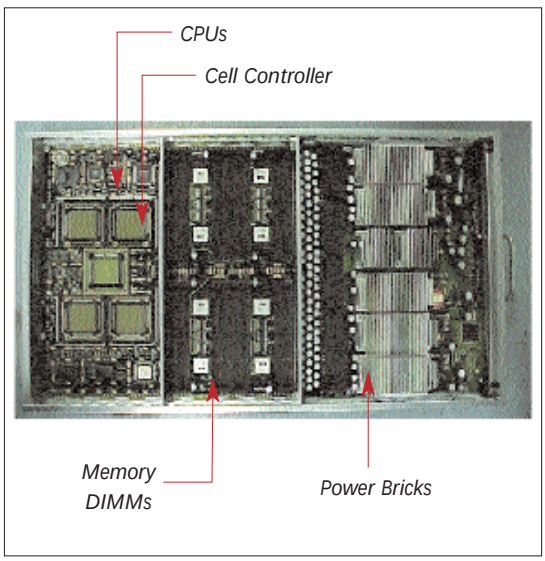
As with all computers, supercomputers too depend on their operating system to provide basic resource management and scheduling features. Most supercomputers run some flavour of Unix. Those based on IBM RS/6000, as well as their P690 family of servers, work with IBM's Unix-based operating system—AIX. The Earth Simulator runs Super-UX, another Unix-based OS. The HP Superdome is pretty versatile, running HP-UX (a Unix based OS), Linux and even the Data Center edition of Windows Server 2003.

What's just as interesting are the high-level languages that such systems can work with. The choice is typically varied, with C, C++ and FORTRAN. For each such parallel computing system, compilers are specifically optimised to be able to extract maximum performance.

For DM machines, specific packages have been developed that will allow for rapid process management and message passing between nodes. The commonly used message passing standards are Parallel Virtual Machine (PVM), which is public domain software developed at the Oak Ridge National Laboratory. PVM comes with C and FORTRAN libraries, to take care of process management, as well as to allow for message passing between processes. Message Passing Interface, MPI, is another such standard. This is also public domain software, and has been developed at the Argonne National Laboratory, Illinois, USA.

Superdome, not your everyday PC

We looked at a typical high performance computing machine that is on the list of the top 500 supercomputers in the world (***www.top500.org***)—the HP Superdome. Physically, the HP Superdome 9000 stands only about a foot higher than a 360 litre refrigerator. The basic unit of the Superdome is a cell that's made up of four processors, modelled on a symmetric multiprocessing architecture—the cell controller ASIC (Application Specific Integrated Circuit), the SD-RAM memory modules, the data buses and the power units. A cell processor can be either the HP PA-8700 or an Intel Itanium 2. The cell controller ASIC determines and co-ordinates memory access between the components on the cell board, and monitors request the need to communicate between other cells.



The Superdome cell—the core of the performance machine

There's also a memory controller ASIC, whose job is to co-ordinate memory requests between the cell controller and the memory modules. Individual cells are connected by a crossbar interconnect that supports up to eight cells; two crossbar backplanes can be linked together to support up to 16 cells.

The Superdome is a ccNUMA system, and provides an SMP model to the OS, by letting any processor access memory distributed anywhere in the system. The crossbar bandwidth for a 64-way (64- processor) Superdome works out to an impressive 64 GBps. In practice, the Superdome 875 has been certified at speeds of 530 GFlops. It can run HP-UX, Linux, or Windows Server 2003 Data Center edition. It comes bundled

Supercomputing Performance

Computer performance is measured on the basis of Flops (Floating Point Operations Per second). The machine is benchmarked using standard tools, and this value is used as a measure of the possible performance of the machine. The Earth Simulator located in Japan, has a maximum speed of 35,860 GFlops. To get an idea of how big this figure is—a Pentium 4 can perform 4 double precision Flops per clock cycle. So a Pentium 4, running at a clock speed of 2.4 GHz, can have a theoretical maximum performance equivalent of 9.6 GFlop—practically, though, you'll never reach this speed.

C-DAC's Param Padma cluster runs at 532 GFlops. The slowest supercomputer on the top 500 list is an old HP Superdome 750 series-based computer with a compute speed of 245 GFlops.

with HP's parallel computing software, with optimised compilers and specialised math libraries.

Putting them through the paces

Over the past few decades, supercomputing muscle was exclusively used to run applications of strategic importance. Governments with nuclear arsenals use supercomputers extensively to simulate the testing of aging nuclear warheads, as well as to refine new designs in laboratory conditions. Other classified applications include solving computationally tough problems, such as cracking secret codes, and running warfare simulation exercises.

Research by quasi-governmental institutions into physics, mathematics and life sciences is something that also borrows a lot of supercomputing time. The NEC Earth Simulator (all of 35.8 TFlops), located in Japan, studies the earth and analyses atmospheric and oceanographic data.

Research in geosciences, such as seismic data processing, involving the processing of large data sets to simulate and analyse seismic behaviour; long term weather forecasting that involves running numbers of variables over large data sets; computing protein compounds to researching new cures; these are all applications of supercomputing.

What's changed since the end of the cold war? With the emergence of cheaper cluster supercomputing, a lot of supercomputing cycles are now being bought and put to use by corporations worldwide. Daimler-Chrysler—the car manufacturer, for instance, uses extensive supercomputing power through their HP Superdome machines, as do many companies in the automobile and aerospace industry. Whether it's designing steering wheels, complex aircraft sections, crash testing, or even prototype development, most of it is done pretty accurately on supercomputers.

Another big customer is the finance industry. World-wide financial transactions are processed on large HPC machines—right from processing a credit card bill to scanning behavioural trends across GDPs, population data and so on. The NASDAQ, and other financial bourses of the world, depend extensively on the reliability and computational speed of supercomputers.

A recent emerging customer base for raw computational power is the film industry; the FX (special effects) in recent movies come courtesy of such computers. In fact, animated movies depend extensively on such machines; *Shrek*, for instance, was made by the DreamWorks studio in partnership with HP, using their HPC machines.

Shared Iron leads

The supercomputing trends of the future indicate that supercomputers of tomorrow will work faster, solve even more complex problems, and provide wider access to supercomputing power. However, another challenge in the making is getting supercomputer horsepower in smaller, more efficient packages. Today's supercomputers take up huge space—around 2000 sq ft and more—with miles of cabling and consume enough power to light up a small town. Tomorrow's supercomputers, may well take up the challenge of giving you all the computing power you need and more whilst using as much resources as a desktop.

SRINIVASAN RAMAKRISHNAN
srinivasan_ramakrishnan@thinkdigit.com

30Minutes Expert

Are you Gaim?

Tired of shuffling between Yahoo!, MSN and AOL? Use multi-network instant messengers instead

If you're a chronic chatter (and who isn't!), with your friends on Yahoo!, colleagues on MSN and friendly strangers on ICQ, consider using a multi-network messengers. As the name suggests, these messengers allow you to log into multiple accounts at the same time using a single IM. The most popular ones are Gaim and Trillian. Gaim supports all the popular networks—MSN, Yahoo!, IRC, AOL, Jabber, Gadu-Gadu and Zephyr. And did we mention it's free? Though Microsoft had announced discontinuance of support for third-party messengers post 15 October 2003, Gaim still works fine with MSN.

Gaim 0.74, the latest version, can be obtained from ***http://gaim.sourceforge.net***. It's compatible with both Linux and Windows, and takes about 11 MB of disk space. When the program is executed, the login screen will be shown. Since it's your first time, the login screen will be empty; go to ***Accounts > Add*** to create new accounts. Enter the details of the messenger account you want to add. In 'Protocol' select the Network type (Yahoo!, MSN, or IRC); in the Screenname and password fields, enter your username and password. The other fields are self explanatory, and aren't mandatory. Repeat the same steps for every account. All the accounts created will be shown in the Accounts window, along with two checkboxes—one for Online and other for Auto-login. Select the Online checkbox to log in to that account, and check the Auto-login box if you want to log into that account every time Gaim is launched.

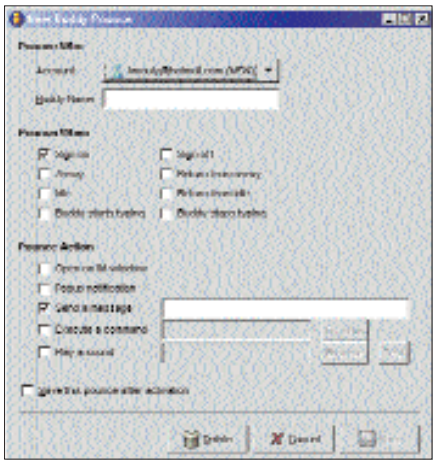
The Protocol, Screenname and Password are mandatory when entering the details of an account

After logging into the accounts, you will be shown a buddy list, just like in other IMs. Click on Buddies in the menu bar to perform actions such adding a buddy, creating a group, blocking a buddy, etc. Other functions are performed just as in any other client—double-click on a friend to start a conversation. Gaim has a tabbed interface in the message window, so you chat with many buddies simultaneously using a single window. To change the status message, go to ***Tools > Away*** and select the account for which you want to change the status, and then select the new status from the cascading menu. To set a customised Away message go to ***Tools > Away > New Away Message***. In the window that appears, enter a title for the away message in the 'Away Title field', enter the actual away message in the textbox below the title field. Note that the customised away message will only be displayed in networks that support them such as Yahoo!.

If you are using the messenger from your office, or if your system is behind a firewall, you will have to enter the proxy server settings—get this from your system administrator. To enter the proxy details, go to the Preferences by pressing ***[Ctrl] + [P].*** In the left pane, select Proxy and enter the details. There are other settings in the Preferences that you can tinker with, such as sound alerts, fonts, etc.

An important setting is Plugins—in the left pane select Plugins; a list of plugins available will be shown. Select the checkbox next to each entry to load the corresponding plugin. The two notable ones are 'Text replacement' and 'History'. Using Text replacement, you can create abbreviations for commonly used expressions while chatting. For example, you can configure 'r u thr' to be displayed as 'Are you there?'. When you start a new conversation, the History plugin will insert the last conversation into the current one. This makes it easier for you to continue from where you left off.

Another useful feature is Buddy Pounce, which allows you to specify a predefined action, such as send a message, play a sound, which is performed when a buddy logs on or off, etc. To enter a new Buddy Pounce, go to ***Tools > Buddy Pounce > New Buddy Pounce.*** In the window that pops up, select the account for which the Buddy Pounce has to be specified. Then enter the e-mail address of the friend for whom the Pounce is intended. In the 'Pounce when' section, select the action that the buddy has to perform such as Log in, Return from idle, and in 'Pounce action', specify the action you want performed. To repeat the Pounce, tick-mark the 'Save this pounce after activation' checkbox. Thus, using Buddy Pounce you can configure Gaim to send a message every time a specified friend logs in.



Enable the 'Save pounce after activation' to repeat a pounce action

However, Gaim isn't exactly the fabled bed of roses; there are some irritants. Incidentally, the two instances of Gaim that we ran in Windows 98 made the entire OS crash, but it didn't do that with Windows XP. Also, sometimes the menus and tool tips don't disappear even after the Gaim window is closed. Overlooking these hindrances, Gaim is quite a practical utility for managing your conversations.

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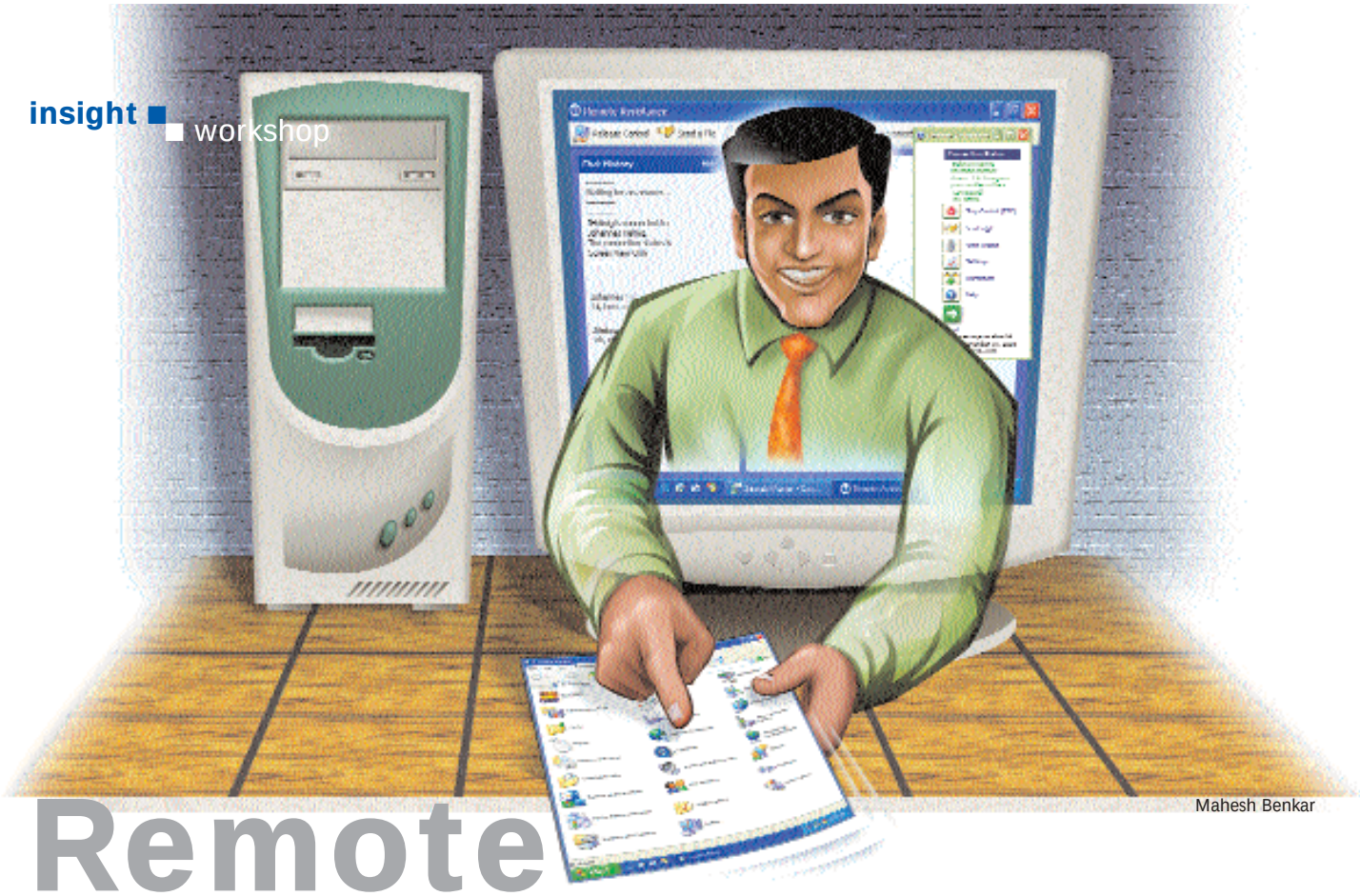


Mahesh Benkar

Remote Controlling Your World

Get real-time help from afar for your ailing PC, or access that file that's miles away in minutes! Here's how...

It's something that's happened to all of us at some time. It's a Friday and your eyes let you see nothing more than to-do lists for the weekend. There's the date whose grown tired of your thousand and one excuses, and the party that demands your presence...You waltz away home, memorising the sequence in which the list has to be executed, and then the symphony throws up a flat note from real life! You just forgot to finish that document that nearly finished you off mentally!

Sprinting back to office is not an option you would like to look at! Now, if only there was a way of doing the damned thing from home!

It's the same scenario when asking for help on a lengthy phone conversation with the so-called help desks. If you could only let them access your desktop for a while and let them fix it remotely, indeed life might actually be worth living, for a change!

Here's the solution—simple remote access tools that let you do just that—access your PC remotely.

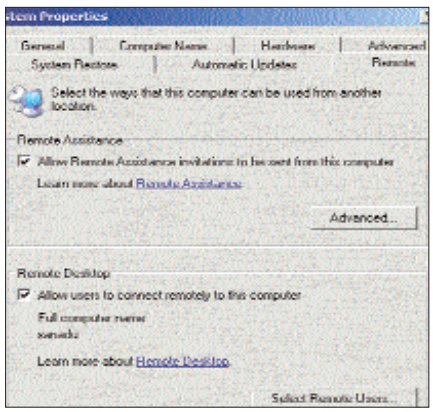
Help's on the way, remotely

Windows XP has a nifty little tool called Remote Assistance that does what its name states—troubleshoot computer problems from a distance.

Remote Assistance is easy to use and secure—no one can take control of your PC unless you send an invitation, and give the person proper authorisation. Along with Windows XP and an Internet connection, you need Windows Messenger 5.0 (which is available, by default, on XP), or greater installed on both the PCs.

STEP 1 Enabling Remote Access

To enable the Remote Assistance services, go to ***Start > Settings > Control Panel***, and click on the System icon. Alternatively, you can use the ***[Windows] + [Pause/Break]*** keyboard shortcut. Under the Remote tab, check the 'Remote Assistance' box. Click on Advanced and ensure that the 'Allow this computer to be remotely controlled' checkbox is ticked. Let the default setting for the amount of time the invitation can remain open stay as 30 days. Keep clicking on OK till you exit the menu.

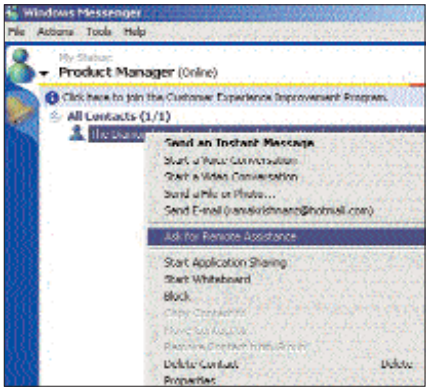


Enable Remote Assistance in the Remote tab of the System dialog box to send invitations from your PC

STEP 2 Inviting the expert

Initiate a Remote Assistance session either using Windows Messenger or e-mail.

Log on using your standard MSN .NET ID, which is the same as the one you use for MSN Messenger. Right-click on the expert's ID in the main window and select 'Ask for Remote Assistance' to send an invitation to the expert.



Inviting the expert to help you, using Windows Messenger, is just a right-click away

STEP 3 Running a Remote Assistance session

A dialog box informs you if the expert has accepted the invitation and is ready to connect to your computer. If you do not get a response after awhile, send an invitation again since your Internet connection might be weak. Click 'Yes' to let the expert view your desktop and chat with you. The expert will have to click on 'Take Control' in case you wish to let him or her have access to your desktop to solve the problem. Accordingly, Remote

This is the expert's view of your desktop

You can chat with the expert through this chat window

Assistance will prompt you on your machine. Choose 'Yes' to let the expert take control. Now, both you and the expert have control on your PC. You can disable access to the expert by pressing [Esc]. The expert can also hand back control to you by clicking on 'Release Control'.

Send and receive files while using Remote Assistance by clicking on 'Send a File'. This can be done by both parties. The receiver is notified of the file transfer. You can also start a conversation by clicking on 'Start Talking'.

Other assistance

Windows XP Professional has an in-built tool, called Remote Desktop that lets you operate on your remote desktop PC. Note that Remote Desktop services are available only for the Windows XP Professional version.

All you need is the host, i.e., the Windows XP Professional machine and the local PC—the client running on any version of Windows. The PCs could be on the same LAN, VPN, or connected over the Internet.

STEP 4 Setting up the host computer

The host computer could be the one at your workplace or home. You would need to set it up before you can access it remotely. Log on as Administrator, since you will need to have Administrator rights to access the Remote options. Go to ***Start > Settings > Control Panel***, and click on the System icon.

Flip across to the Remote tab and check 'Allow users to connect remotely to this computer'. Click on the 'Select Remote Users' tab. Here, click on Add to add users who intend to connect remotely. Either enter the usernames, or locate the usernames by clicking on Advanced. Ensure that the Location (computer name) is correctly set, and click on Find. Click OK, to get back to the Select Users menu. Again, click OK, and the user is added to the list. By default, the Administrator has access to the service. You can remove a user from the list by highlighting the username and clicking on Remove. Finally, click OK, and return to the Remote menu. Here click OK, and your system is set to receive the remote connections. You can now lock your Windows XP machine.

TIPS

Ensure that Terminal Services, Remote Procedural Call (RPC), Remote Access Auto Connection Manager, Remote Access Connection Manager and Telephony are running on your PC before using any of the remote services. Go to ***Start > Run*** and type ***'services.msc'*** to start the Services tool. Right-click on the service and click on Start to start it.

Also, click on Properties and ensure that all the associated services listed as Dependencies are activated.

Fast Moves

Apart from its flexibility, and the fact that it comes with Windows XP Professional, Remote Desktop has other great features that make it even more productive. If you happen to be working on your remote desktop from, say, your home PC, and should a family member want to use it for a while, you can use Windows XP's fast user switching feature to quickly log out from your user account and switch across individual accounts, without closing the applications. Resume work on your remote session once you log back into your account.

Enable Fast User Switching by going to ***Start > Settings > Control Panel*** and clicking on User Accounts. Here, click on 'Change the way users log on or off', check 'Use the Welcome screen' and enable 'Use Fast User Switching'. Finally, click on 'Apply Options' and exit. Remember to choose Switch Users while logging out. You will be logged off, but your applications will continue in the background.

Note that you also need to have the necessary associated services turned on to connect remotely.

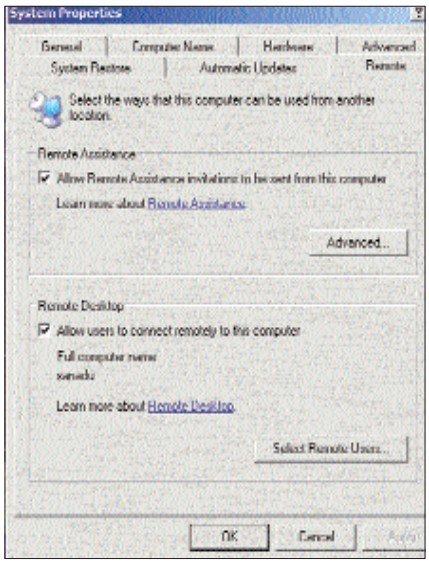
Also remember to leave your computer turned on, and connected to the network—the Remote Desktop service will not be able to physically switch on your computer!

STEP 5 Setting up the client

You need to have the Remote Desktop Client software to connect to the host computer. By default, it's installed in all Windows XP Professional and Home edition computers. You will have to install the Remote Desktop Client software separately for all other Windows editions.

STEP 6 Starting the session

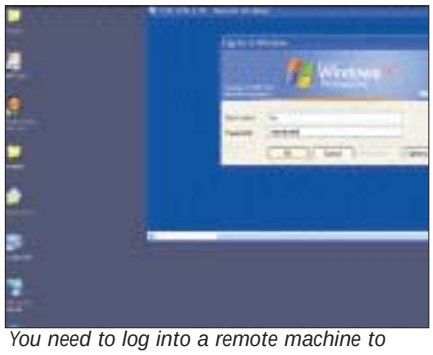
Starting a remote desktop session is pretty simple. Go to ***Start > Programs > Accessories > Communications*** and click on 'Remote Desktop Connection'.



Turn on remote services on the Windows XP Professional host computer in the Remote Tab of the System Properties Dialog

Click on Options in Remote Desktop Connection. Here, in General, set all the options related to Logon settings. Save your previously entered sessions, along with the authentication details in Connection Settings, so that you can log on without entering a user name and password. Tweak the keyboard and sound options under 'Local Resources'. Programs lets you start programs when you connect, and Experience lets you set the kind of eye candy that's acceptable, considering your connection speed. Keep the eye candy to a minimum, and set the Colors options (within the Display tab), to a lower value if you have low bandwidth connectivity. Also, remember to change the resolution to an appropriate value.

Now, specify the computer that you intend to connect to. Enter in the host's name or IP address, and click Connect. A



You need to log into a remote machine to start a remote session

logon prompt comes up. Enter the username and password.

During the session, the host is locked. Unlock it by pressing ***[Ctrl] + [Alt] + [Del],*** and the remote session is terminated.

There's more

Remote Desktop can be used in full-screen mode, or as a windowed session. The default settings apply keyboard shortcuts for the full-screen mode. Hence, you get the feeling of physically operating your host PC. In fact, just about everything

Use Remote Desktop to copy text across PCs, and more

appears as though you are physically on that host computer—your disk drives, your mapped and network drives and network shares, and so on—all your PC's resources are literally at your fingertips, and you could start file transfers and send and receive e-mails or review documents.

Remote Desktop can also be used inside an office to collaborate over a project, or share an idea with the rest of your colleagues. Since most remote connections support text and graphics cutting and pasting through the clipboard, you can cut out or copy text from the remote machine and paste it to a local document as often as needed.

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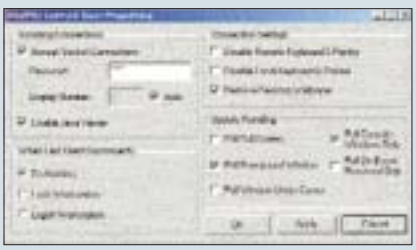
Virtually Computing

Virtual Network Computing (VNC), a product of open source engineering, has a number of distributions existing currently. RealVNC is one such version that's free and reasonably small in size. Also its winning point is that it lets you connect to any Windows PC.

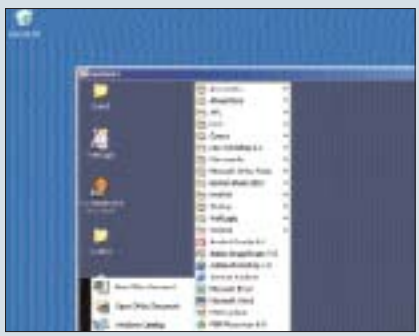


Configure VNC on the server before you connect to another remotely

Install RealVNC on both, the remote computer as well as the local PC. Go to ***Start > Programs > RealVNC*** on the host PC and select 'Run VNC Server'. This pops up the Properties menu. Under Incoming connections, check 'Accept Socket Connections' and enter a password for the session. Click on OK to start the server. On the server, navigate to ***Start > Programs > RealVNC*** and select 'Run VNC viewer' to start the VNC viewer. Here, enter the IP address. Once a connection is established, you will be prompted for the session password that you had provided earlier. You should now be able to remotely access the machine.

Though using VNC is a breeze, the end results aren't the best possible. While running it on PCs connected to a 100 Mbps LAN, we found that Remote Desktop works more smoothly than VNC when connecting two Windows XP Professional machines to one another. VNC displayed a slight lag.

VNC supports copying and pasting text, but we couldn't get graphics pasted. However, nothing beats the fact that it lets you connect to just about any Windows machine. It also comes with support for lots of other platforms and being an open



Use VNC to be able to remote control any PC

source product, it's bound to get better.

Hence Remote Desktop is the best tool to use while connecting across to a Windows XP Professional system. Opt for RealVNC if you intend to connect remotely to any other Windows PC.

IMAGING: Atul Deshmukh

Contacting HARMONY

Synchronising Outlook contacts helps you lay your hands on just the right one when you mean business!

You know the predicament—you have a laptop, an office desktop, and a handheld, and then you have hundreds of contacts scattered across these three gadgets. Which basically means, each time you need to find the details of one of those contacts, you have to remember where you saved them. Which in turn means—oh well, forget it!

You'd rather spend that time synchronising all your contacts. Why? Because, siree, synchronising makes managing your Microsoft Outlook contacts as easy as the proverbial apple pie. Here's how.

Synchronising on two computers

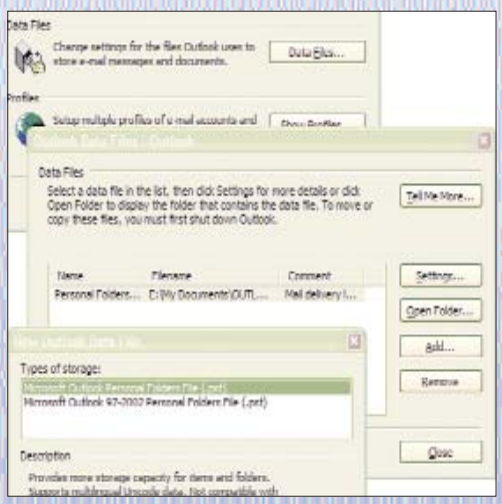
You start off by manually updating the contacts on a system that runs Outlook from another PC by copying the Personal Folder Storage (.pst) file onto it. A .pst file is huge—it contains all your mails, contacts, calendar, tasks and notes—so the transfer process could be tedious, unless both systems are on the same network. One way to overcome this is to export only the contacts folder as a .pst file. An even better solution is to create a separate .pst file for contacts, as it makes for easier contacts management.

For example, the size of this writer's .pst file was 129 MB. By creating a separate file for contacts, it reduced to less than 1 MB. Get the picture?

Find it on the Mindware CD
Intellisync for Yahoo!
Oxygen Phone Manager II for Nokia Phones 2.0

STEP 1 Creating a new .pst file

To add a new .pst file that stores the transferred contacts, go to ***Control Panel > Mail*** and click Data Files. Click Add, choose 'Outlook Personal Folder File' and click OK. If you use Outlook 2003, keep in mind that the .pst file can't be used by earlier versions. So, make sure you choose 'Outlook 97-2002 Personal Folder File'. Now, specify a filename and location for the file and click OK. Then, in the screen that appears, enter a suitable name such as 'Shared Contacts' for the folder and click OK.



Create a new data file to store contacts

Copying contents to the new .pst file

Open Outlook, and you'll see the newly created 'Shared Contacts' in the folder list. Right-click it and select 'Copy Contacts'. Choose 'Shared Contacts' as the target folder and click OK.

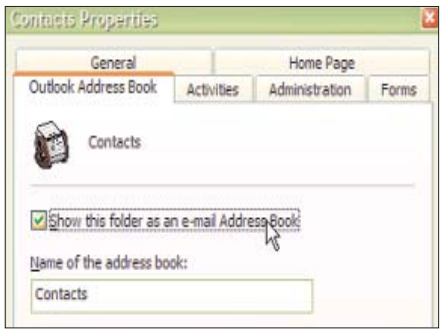
Configuring Outlook

Outlook now needs to use the newly-created contacts folder. First, delete all entries from the original contacts folder. To remove the reference to this folder, right-click it, select Properties

Copy the existing contacts into the new contacts folder

and go to the Outlook Address Book tab. Here, uncheck 'Use this folder as an e-mail address book'.

To configure the newly created contacts folder as the address book, right-click it and choose Properties. Go to the 'Outlook Address Book' tab and tick 'Use this folder as an e-mail address book'. Now,



Set the new contacts folder to be used as the address book

you can easily share this folder on machines running different versions of Outlook.

For easy sharing between the two, configure Outlook on the other system too. First, create a new .pst file as explained above, and set it to be used as the address book. Now, copy the contacts .pst file containing new or updated contacts onto the system that has the older version. For example, copy the .pst file that's on your desktop PC onto your laptop, when carrying it on a business trip. When you return with a whole new set of contacts, all you need to do is copy the file back to the desktop.

A Cautious Backup

Do remember to back up your personal folders in Outlook before getting them synchronised with other devices. This will save you the headache arising out of an unforeseen catastrophe. Here's how the pill works.

To backup, go to ***File > 'Import and Export'*** to bring up the wizard. Choose 'Export to a file' and click Next. Choose 'Personal Folder File (.pst)'. In the next step, click the root folder 'Personal Folders', check 'Include Subfolders' and click Next. Specify the filename and the path to the location where you intend to export the folders, and then click Finish. Finally, specify an password for the file—this is optional—and click OK.

To restore the file, firstly, delete all the contacts if you find duplicate entries in your contacts folder. Now, go to ***File > 'Import and Export'***. The 'Import and Export Wizard' starts. Click on 'Import from another program or file' and click Next. In the list of file types, scroll down and choose 'Personal Folder File (.pst)'. Next, click Browse and point to the backup file. Click 'Replace Duplicates with items imported' and then click Next. In the next step, click the folders to be imported. Click Contacts if you just need to import them, else click Personal Folders. Tick 'Include subfolders' too. Click on 'Import items into the same folder in', choose the folder where the items are to be imported and then click Finish.

Using online services

There are several Web storage services that allow you to synchronise Outlook contacts with their address books in minutes. You can use these online address books while on the move, or to synchronise contacts on another PC. We recommend Yahoo!.

There are two methods to synchronise contacts. One is to export the contacts from Outlook as a Comma Separated Values (.csv) file, and then import it into Yahoo! Calendar. The other is to use the Intellisync software for Yahoo!.

The second method is better, since it allows two-way movement of data, and you're asked to specify the action to be taken in case of a conflict, such as different values in the 'Birthday' field.

Downloading Intellisync

You can download Intellisync from Yahoo!. Go to ***http://address.yahoo.com***, log in with your Yahoo! ID, and click on Sync. Then, click on 'Get it now!', click Save and save the application to a suitable location. Double-click it and follow the installation wizard.

Configuring Intellisync

Once it's installed, run Intellisync, click on Setup and then on 'Application Setting'. Specify the items you want to sync with Outlook such as the Address Book, Calendar, and Notepad. If you have a separate .pst files for contacts, specify this by clicking Browse. Click OK and enter your Yahoo! ID and password. Finally, click Save, and you're ready to synchronise!

Configure Intellisync to synchronise Yahoo!'s address book with that of Outlook

Synchronising

The configuration done, click Sync to start synchronisation. If a conflict arises during synchronisation, you'll be asked

Use IntelliSync for Yahoo! to sync your contacts with Yahoo! in seconds. If there's a conflict in the entries, you're asked what action to take

what to do. Do not make any changes in Outlook or Yahoo! while synchronisation is in progress.

Synchronising Pocket PC using ActiveSync

Microsoft offers ActiveSync to synchronise contacts between a Pocket PC and Outlook. Here's how you use it.

Step 1 Installing ActiveSync

Download and install the latest version of Microsoft ActiveSync (version 3.7.1) from ***http://www.microsoft.com/windowsmobile/resources/downloads/pocketpc/activesync37.mspx.***

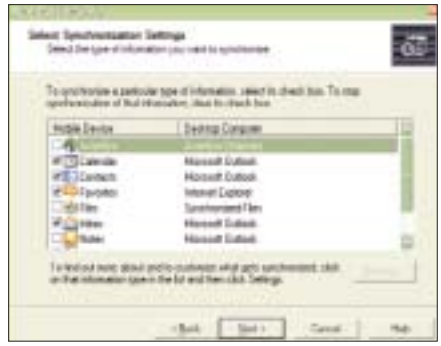
Step 2 Configuring the connection

Once ActiveSync is installed, connect the cable to the PC, turn on your Pocket PC and place it in the cradle. Setup then detects the Pocket PC, and you're asked to set up a Partnership.

If you just need to copy and move information between the Pocket PC and the computer, choose No to set up the Pocket PC as 'guest'. However, if you need to sync your Pocket PC with Outlook, select Yes. In the screen that comes up next, specify whether you want to set up Partnerships for one or for multiple computers.

Step 3 Choosing the applications

You can choose to synchronise Outlook Contacts, Inbox, Calendar, Notes and Tasks. You can also choose to sync Favorites, Access databases, or any file at all. By default, the file in ***My Documents\Pocket_PC Files*** is synchronised. However, you can specify other files and folders by clicking on 'Settings'. Click on Next and then on Finish to exit Setup.



Choose the applications you want to synchronise with your Pocket PC

Step 4 Synchronisation

You are then taken to the ActiveSync application window, and syncing begins automatically. Click Synchronise if it doesn't. The application will look for the changes, and by default, ask you what action to take.

You can choose to merge items on the Pocket PC with the items on your PC, replace items on the Pocket PC, or take no action while synchronising

Synchronising mobile phones

Outlook contacts can also be synchronised with your mobile phone. All you need is a data cable, and software such as Oxygen Phone Manager II (OPM). You don't even need a high-end phone. Entry-level phones from Nokia, such as the 3310 and 3315, do just fine. Data cables can be purchased for a few hundred rupees.

Step 1 Installing OPM

Download OPM from ***http://www.opm-2.com***. Run Setup and follow the installation wizard.

Step 2 Configuring it

Connect the data cable from the phone to either the COM or the USB port. OPM then detects the phone and prompts you to back up the phone data. Click Yes. Now, go to ***Tools > Options***, and click 'Outlook mapping' under 'Import & Export'. The left column shows you how OPM identifies your phone data, and the right side shows how they are mapped with the fields in Outlook. For low-end phones such as the Nokia 3315, OPM puts the number in the 'General' field, which is mapped to the Primary Phone field in Outlook. So, for this phone, syncing takes place only between these fields. You can change this default mapping. For example, you can synchronise phone numbers with the Mobile Phone field in Outlook. To do so, click on the icon next to the Mobile field in OPM, uncheck Mobile Phone and click OK. This removes the mapping of the Mobile field with Outlook's Mobile Phone field.

Now, click the icon next to the 'General' field and tick 'Mobile Phone'. Click OK, and the phone numbers on your cell phone will be mapped to the Mobile Phone field in Outlook.

Step 3 Synchronising data

There's no direct method to sync data—you can do it by either exporting or importing contacts. If you export contacts to Outlook, OPM intelligently updates the entry if the names in the phone book match the Full Name in Outlook, or else it creates new entries. To export contacts to Outlook, click Phonebook in the navigation pane, click Export and then click on the 'MS Outlook (Default Folder)'. If you select 'MS Outlook (Custom Folder)...', you're asked for the folder that you wish to sync. Click OK, and you receive a security warning. Select '5 minutes' and click OK.

A security warning comes up when exporting phone contacts to Outlook

Likewise, clicking on Import lets you import contacts from Outlook. Due to memory constraints, the phone may not store all the numbers Outlook has. However, you can choose to import selected items.

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IMAGING: Atul Deshmukh

Boot loaders are notorious for causing grief while trying to boot into multiple operating systems. Using LILO you can gain total control of the booting process

BOOTS in Control

Booting into Linux is almost magical; the stream of messages popping past is a sign of a healthy operating system starting up, or it could be a chance of coaxing a sick install back to life. However, there is a little something that lies between the point where your BIOS flashes past and Linux boots up—the boot loader. In true Linux spirit, boot loaders are not just little Windows-style point-and-click menus, but come with some pretty sophisticated features. The two most common are GRUB and LILO. Here, we'll take a look under the hood of boot loaders—LILO in particular.

What's the boot?

You power up the PC, and the code that resides in the BIOS kicks in. It detects and initialises all devices, and then clears all the registers. Now the BIOS code picks up the data sitting in the MBR (Master Boot Record) of the first boot device—which you've set in the BIOS settings—and places it in the system memory. This is the boot loader, which then starts the process of loading and transferring control to the operating system.

LILO is one of the oldest boot loaders used to boot into Linux. Modern versions of LILO, which ship with the recent distributions, come with a graphical boot-menu. In Red Hat Linux 8 and 9, you have a choice between the default loader GRUB, or LILO. The latter allows you to boot into a wide variety of operating systems, including most distributions of Linux and also Unix clones such as FreeBSD Unix and NetBSD Unix; you can also use LILO to boot into more esoteric operating systems such as GNU/HURD and Solaris.

Put on those booties

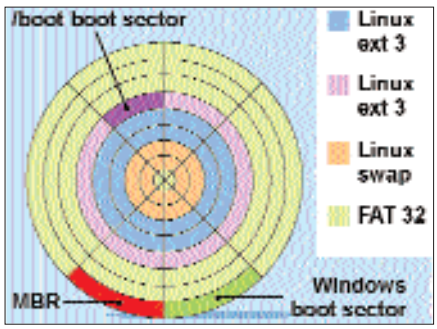
LILO can be installed while installing Linux in your system. The Red Hat Linux 9 installer, for example, will let you install the boot loader after partitioning your hard drive.

Before choosing a boot loader, make sure to set a separate ***/boot*** partition when partitioning your hard drive. This is best when installing Linux to a partition larger than 8 GB. If you have multiple hard drives, you should install the ***/boot*** partition in the first (master) drive—***/dev/hda***—within the first 8 GB of the drive. While all modern BIOSes, and LILO itself support large drives, you should do this if you happen to get warning messages that indicate there might be a problem with booting into Linux.

In Red Hat Linux 9, LILO can be installed by changing the default boot loading options—in this case, GRUB. The installation program lets you choose between GRUB and LILO in the Boot Loader Configuration screen. To choose LILO, click on Change Boot Loader. Here you can choose to install LILO, GRUB, or no boot loader at all. Choose 'Use LILO as the boot loader'. Next, assuming that you are using multiple operating systems, you can select the default operating system to boot into. Select the 'Default' checkbox next to one of the operating systems listed. If you have other OSes installed, but they do not show up on this list, click on Add and add the operating system. You can also use the Edit and Delete options to

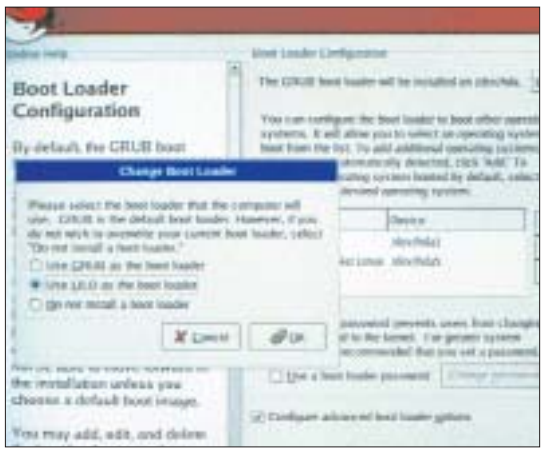
edit or delete the boot options for any OS. Click on 'Use boot loader password' to set a password at boot up. Even if you password protect your LILO, any user can still bot into Linux, but cannot change or even access any of LILO's advanced options, such as booting into single user mode.

Next, tick the 'Configure advanced boot loader options' checkbox. Here you can choose where to install LILO. Choose between installing LILO in the MBR (***/dev/hda*** for the master drive), or the first sector of the target partition (***/dev/hdaX***, where 'X' is the boot partition). If you intend to run a multi-boot system with Windows 98, go ahead with the default option and install the boot loader to the MBR.

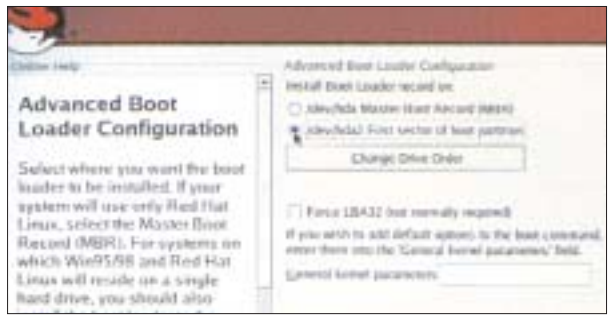


NTLDR was loaded into the MBR, and LILO was loaded on the boot sector (first sector) of the /boot partition. On booting up, the NTLDR is loaded into the memory and executed; if Windows is selected, the NTLDR loads the OS. When Linux is selected, the NTLDR passes control to LILO, and LILO then loads Linux

Of course, we loaded LILO ourselves to test everything out first-hand. The drive was partitioned for use with Windows XP (FAT32 file system) and Linux. The first partition (***/dev/hda1***) was set at 4.5 GB for Windows XP. Next, the ***/boot*** partition (***/dev/hda2***) was restricted to 80 MB, while the ***/*** or ***root*** partition (***/dev/hda5***) was set at 3 GB. The Linux swap partition (***/dev/hda3***) was set at about 350 MB.



Selecting LILO as the boot loader of choice



Getting LILO into the boot sector of the /boot partition

Then, we installed Windows XP, and its boot loader (NTLDR) was automatically installed to the MBR. LILO was installed on the boot (first) sector of the ***/boot*** (***/dev/hda2***) partition—not on the MBR. This meant that NTLDR was left untouched, and LILO would not interrupt in its functioning. Similarly, if you happen to be using another boot loader—say if you happen to be running another Linux or Unix variant and would like to preserve the boot-up structure—choose to install LILO on the first sector of the ***/boot*** partition, and not on the MBR. Installing it on the MBR wipes out the original boot loader and renders the system incapable of booting into any operating system. Remember, if you've specified separate ***/boot*** and ***/(root)*** file system partitions whilst partitioning, LILO is installed to the first sector of the ***/boot*** partition, not the ***/(root)*** partition.

Leave the Force LBA32 option unchecked—modern systems don't need this. Add any parameters you want in the 'General kernel parameters' box—leave it empty if you don't know what you're doing—and you're done. In the screens that follow, you will go through the rest of the Linux installation procedure. If you've chosen to install LILO on the first sector of the boot partition (***/(root)*** or ***/boot***), you will have to make a boot diskette—LILO has not been installed on the MBR, so you will need to boot intoLinux through a boot diskette. The Red Hat installation program will prompt you to make one after all the software has been installed.

Boot it up

If you installed LILO on the MBR, you will be presented with a simple graphical boot menu that will allow you to choose the operating system to boot into. There is generally a 5-second timeout period—you can alter this later—after which the default operating system chosen at the time of installation is booted into. Although it's unlikely, if you face any problems with this, you can use the boot diskette to boot into Linux and make any changes to the LILO configuration. If you have installed LILO on the first sector of the boot partition, use the Linux boot diskette to boot into Linux.

With the default install of LILO, you should be able to boot into Windows 95 or 98 straight from LILO; however, Windows XP users will need to use the boot diskette. Remember, if you run Windows XP, and have installed LILO on the MBR, you will not be able to boot into XP through LILO—you'll get a fragmented 'L' appearing on the screen.

Smart boot

Once you've booted into Linux, you can change the way LILO works. Like many other Linux programs, LILO maintains a configuration file located at ***/etc/lilo.conf***. LILO reads the configuration file whilst booting to locate the necessary files.

The configuration file looks like this:

```
prompt
timeout=50
default=linux
boot=/dev/hda2
map=/boot/map
install=/boot/boot.b
message=/boot/message
lba32

image=/boot/vmlinuz-2.4.18-14
        label=linux
        initrd=/boot/initrd-2.4.18-14.img
        read-only
        append="root=LABEL=/"

other=/dev/hda1
        optional
        label=DOS
```

Any lines starting with a # are considered commented and are ignored by LILO.

Here, ***'timeout=50'*** indicates a timeout period of 5 seconds—change this to increase the timeout, such as 100 for 10 seconds.

GRUB

The GRand Unified Boot loader is probably the slickest Linux boot loader of all time. Historically, it's part of the GNU project, and is more accurately called GNU GRUB. It comes with a neat menu interface that features an easy-to-use menu editor, as well as a command-line interface. GRUB is also a shade easier to use than LILO, and is recommended for new Linux users, especially if you plan to multi-boot with Windows XP. Red Hat has made GRUB the default boot loader, and there are indications that Red Hat plans to drop LILO in the near future. Installation is simple, and GRUB can load any operating system easily.

You can install GRUB directly on the MBR, and it will boot both Windows 98 and Windows XP. Unlike LILO, you won't need to use NTLDR to boot into GRUB, but you can get NTLDR to load GRUB if you want. Setting this up is a procedure similar to that described for LILO. This way, the MBR remains safe and GRUB resides in the first sector of the boot partition.

Here's a quick look at what GRUB gives you: GRUB works off the ***'/etc/grub.conf'*** configuration file. Unlike LILO, GRUB will read the configuration file at boot time, so you don't need to re-run GRUB every time you make a change. You can edit the menu selections to enter

Editing your GRUB menu is as easy as pressing [E] at the prompt

parameters at boot time. Select the menu entry and press [E]—this opens the menu editor. Make the required changes, and press [Enter] to register them. For example, to boot into single user mode, select the kernel you want to boot into, then press [E]. Select the line that starts with the command 'kernel' and add the word 'single' to the end. Now you should be able to boot into Linux in single user mode. The line should look like ***'kernel /vmlinuz-2.4.18-14 ro root=LABEL=/ single'.***

For further configuration, check out the command line feature with the GRUB prompt. To access this, press [C]. [Tab] will give you a list of commands here. You can also boot the kernel from here. For example, the following command will boot into the kernel image called 'newkernel' with the root drive being ***'/dev/hda5'***:

'kernel (hd0,1)/boot/newkernel root=/dev/hda3 read only'

'boot'

Press [Enter], and if the kernel image is located in the right place, the kernel will boot. GRUB is simple, elegant and undoubtedly a very good boot loader.

'default=linux' indicates that the default OS to boot into is Linux. Remember, don't edit the 'boot', 'map', 'install' and 'message' values—all of these are set by the LILO installer, and do not need to be changed.

'***image=/boot/vmlinuz-2.4.18-14***' is the line that tells LILO what kernel to load. This file is located in the ***/boot*** directory and is the core kernel image file. The lines that follow are the additional parameters that are passed on to the kernel while booting. The 'label' is the name of the kernel; this is the name that will be displayed in the boot menu, and is used next to the 'default' parameter. 'read-only' means that the root filesystem is initially mounted as read-only, and later in the boot process, is made read-write. If you compile a new kernel, you will need to make similar entries in the lilo.conf file, with parameters specific to the newly compiled kernel.

The 'other' entry, and the lines that follow, let LILO boot to a non-Linux operating system. In this case, no kernel image file is loaded; instead, the boot sector of the specified partition is loaded into memory and executed.

Booting Windows

Booting into Windows 98 is simple, as LILO will load and execute the specified Windows drive boot sector, as indicated in lilo.conf. However, LILO cannot directly boot into Windows XP, as Windows XP uses the NT boot loader, NTLDR. To be able to successfully multi-boot Windows XP and Linux with LILO, you will need to tweak NTLDR. This way, you can boot into Windows XP or Linux easily. To boot into Linux, you have to get NTLDR to transfer control to LILO. Remember, this technique works only if you run Windows XP on the FAT32 filesystem; LILO does not work with NTFS.

In our example, Windows XP resides on the ***/dev/hda1*** partition, the ***/boot*** partition is ***/dev/hda2*** and the ***/(root)*** partition is ***/dev/hda5***. First, you need to create an image of the Linux boot partition. As root, enter the following command:

dd if=/dev/hda2 of=/bootsect.lnx bs=512 count=1

This command copies the first 512 bytes of the ***/boot*** partition into a file—***bootsect.lnx***, in the ***/(root)*** partition.

Next, you need to copy this file to the Windows XP drive. You can do this either by copying the bootsect.lnx file into a floppy, booting into Windows XP and copying it to the 'C:' drive, or by mounting the XP filesystem using the 'mount' command:

mkdir /windowsxp

This creates a directory, a mount point for Windows XP. Now mount the drive using the command:

mount -t vfat /dev/hda1 /windowsxp

Copy bootsect.lnx to the C drive by typing:

cp /bootsect.lnx /windowsxp

Now you need to boot into Windows XP to tweak the NTLDR. You can do this by adding an entry into the ***boot.ini*** file—the NTLDR equivalent of the ***lilo.conf*** file. Normally, this is not visible in the C drive. You can edit it by going to ***Start > Run*** and typing in ***cmd.exe***, and at the command prompt typing ***edit boot.ini***. Add the following line to the end of the file:

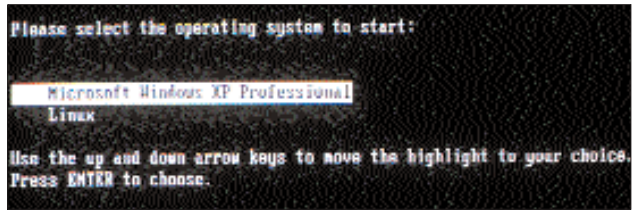
C:\bootsect.lnx="Linux"

Now, save the file and close it. Do not edit any other settings, or you may not be able to boot into Windows XP. The edited file should look like this:

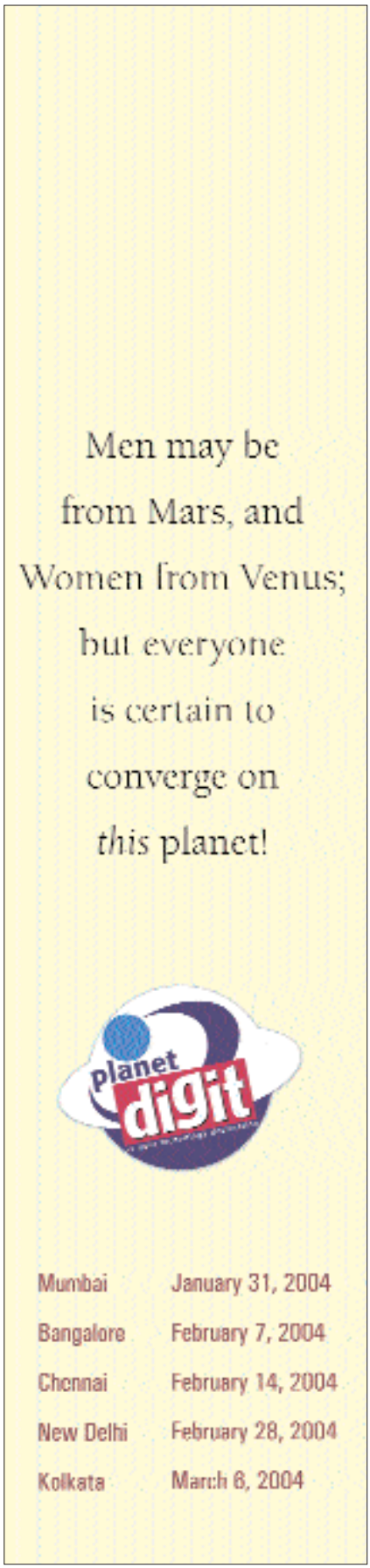
[boot loader]

timeout=30

default=multi(0)disk(0)rdisk(0)partition(1)\WINDOWS



NTLDR boot menu: Booting into Linux, the Windows XP way



Honey, I Nuked the MBR

Playing with the MBR is dangerous. If you mess up, you could render your system incapable of booting into any operating system. So how do you prevent this from happening? Take a look at some preventive measures and cures to this problem.

First, plan ahead for such contingencies. Make backups and create boot diskettes for all the operating systems that you are running, and keep the original bootable install CDs handy as well. If you managed to wipe out the MBR, or render the NTLDR or LILO boot loader unable to boot, we can help you boot into Windows. To boot into Linux, you'll have to re-install LILO.

The tools you need before you start	What to do if you nuked your MBR by mistake
Windows 98 Create a Windows 98 bootable diskette or MS-DOS bootable diskette	Boot from the diskette and run the following command from the DOS command line: ***fdisk /mbr***, then press [Enter] and reboot.
Windows XP The bootable Windows XP installation CD	Boot from the CD and run the recovery console, select the installation and get into command line interface, type ***'fixmbr'*** to fix the MBR, confirm, then exit and reboot.
Linux Bootable Linux diskette or Linux installation CD	Boot into Linux using the diskette or the CD. Log in as root. At the command prompt, use ***/sbin/lilo -u*** to uninstall LILO. If you're using the CD, get into Rescue Mode (for Red Hat Linux, press [F5] at the boot prompt). Then go through the steps, and finally, to make your system the root partition, type '***chroot /mnt/sysimage'***. This is essential to run LILO if you've booted from the CD.

[operating systems]
multi(0)disk(0)rdisk(0)partition(1)\WINDOWS="Microsoft Windows XP Professional" /fastdetect
C:\bootsect.lnx="Linux"

Now reboot the system. NTLDR will prompt you to choose between Windows XP—which is default—and Linux. If you choose Linux, LILO will kick into action and present you with its boot menu—this again gives you the option of booting into Linux or DOS. Selecting DOS will take you back to the NTLDR boot menu.

Professionals to boot

Beneath its rather simple interface, LILO is a very powerful boot loader. To go beyond the graphical boot menu and take a look at the text menu, press ***[Ctrl] + [X]*** at the graphical boot screen. A LILO prompt comes up. You can browse through the available options by pressing [Tab]; this will list out all the options. At the LILO prompt, you will have to key in the option, and any parameters that you would like to put in.

Should you wish to log into single-user mode as root after losing the root password, or to repair a damaged system, type ***'LILO:linux single'.*** This boots Linux into a single user state. To mount another partition, use the ***LILO: root=/dev/hdaX*** command, where ***'X'*** is the partition you want to mount—an 'ro' option can also be added, if you want the partition to be mounted as read-only. You can also get LILO to recognize additional memory if added to the system. This will generally be recognised, but should you have trouble, you can add ***linux mem=256M*** (if you have 256 MB of RAM).

Consult the LILO man pages and infopage for more esoteric options. If there are some options that you pass regularly, such as getting Linux to recognize additional memory, append ***append="mem=256M"*** to the bottom of the required image.

Finally, be sure to run LILO once afterwards, to reflect all changes. Remember that LILO creates a map file at installation time, and doesn't read the configuration file at boot-up. So, as superuser, run ***/sbin/lilo*** at the prompt. If all goes well, you will see an output without error messages or warnings. Most fatal errors can be traced back to entries in the ***/etc/lilo.conf*** file.

Though this article is LILO-specific, it also shows you how boot loaders work in general. Just remember, while LILO (and GRUB) are great fun to tweak, they can also cause you quite a lot of anxiety if you mess up. Keep your boot diskettes handy, be cautious, but explore and make sure you lace up your boots just right!

SRINIVASAN RAMAKRISHNAN
srinivasan_ramakrishnan@jasubhai.com

A network drive with hiccups, a short-sighted screen, upgrade troubles, lame Autoruns and sick CPUs... queue up now to get it all fixed

Yahoo! It's up again

Q. I recently installed Windows XP on my PC. The configuration is Celeron 733 MHz, 128 MB RAM and an 8 GB hard disk. Whenever I try to access the site ***http://groups.yahoo.com*** I get the following error:
"Gateway Timeout
The following error occurred:
A gateway timeout occurred. The server is unreachable.
Retry the request.
(GATEWAY_TIMEOUT)
Please contact the administrator."
All other Web sites open fine. What do I do?
Avinash

A Don't worry. This happened because the government of India banned the Web site for a short while.

Click the Groups link on the Yahoo! Groups page

You should be able to access the site now. If you still face problems, go to ***www. yahoo.com***, click on Mail, and log in with your username and password. Now click on the Yahoo! link on the top right, and when the page loads, click on the Groups link.

Click the Yahoo! Link on the top right corner of the page to move ahead

Where's the SFC?

Q. I have a Pentium III with a 20 GB hard disk, an 810e motherboard, 128 MB RAM and a Savage display card. I recently installed Windows 2000, and tried to run SFC (System File Checker), but it didn't start. Is there any way to open SFC in Windows 2000 professional?
Amish Mehta

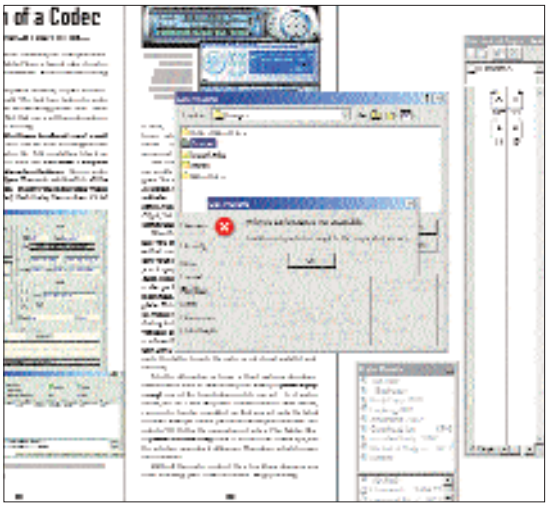
A Don't be alarmed. The fact is, Windows 2000 only has a DOS-based SFC. To start it, go to the command prompt, type ***'sfc'*** and press [Enter]. Here, you'll find some help on how to use sfc.exe, and the syntax to use.

Moody network drive

Q. I run Windows 2000, and whenever I start Adobe Photoshop, I am unable to access a Mapped Network drive; it gives the following error message: "Insufficient quota to complete the requested service." If I close Photoshop, I can access the drives again. Only rarely can I access network drives while using Photoshop.
Shiva Pillai

A This problem is caused by either a corrupt TCP/IP protocol, or a memory leak problem. Firstly, try to re-install the TCP/IP protocol—go to ***Start > Settings > Control Panel***, right-click on Network and select Properties. Now select TCP/IP, and remove it. Remember to note down the configuration settings before you remove it, as you will need these settings again while re-installing. Now restart you machine, and reinstall TCP/IP.

The actual problem occurs when the Windows I/O operation fails due to



The error that appears when attempting to access a network drive

insufficient system resources, which means you may have a memory leak. As a system's resources vary from one moment to another, you actually might be able to access network drives after a few minutes or seconds. An immediate solution is to close unimportant applications to free some resources, and try accessing the files again.

If this does not help, or if you have nothing else open anyway, the next best thing is to restart Windows. For a more permanent solution, you need to find the faulty module, program, application, or driver that is causing the memory leak. The leak is caused because of a driver or an application that uses the memory to function, but does not release it as soon as the work is complete. This builds up over time, until all the system resources are utilised, causing errors. This is why the problem is temporarily solved when you restart—the memory is cleared and reallocated.

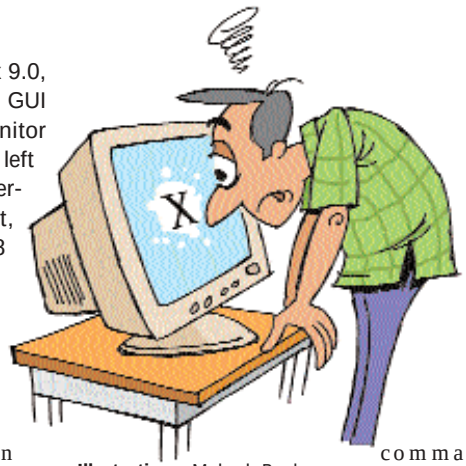
You can use Performance Monitor to detect faulty applications, or use ***Poolman.exe*** to detect driver problems—this is found in the ***\Support\Tools*** folder on the Windows CD-ROM. If you find a program that's causing the problem, make sure to remove any service related to that process. Next, remove any other program or application interacting with the same process, and finally, remove the faulty process itself.

You should also send a detailed e-mail to the vendor or manufacturer of that application to inform them of your problem. Hopefully, they will find a solution, and prevent others from facing the same.

Enlarge my X screen

Q. I recently installed Red Hat Linux 9.0, and noticed that the X-window GUI screen occupies less than my monitor viewable area—an inch on both the left and the right. I have an ASUS motherboard with an Intel 845GL chipset, 128 MB of DDR RAM and on-board 8 MB VGA. My monitor is a 15-inch LG Studio-works 520Si. Are there some extra parameters to be given in XF86Config?

Sandeep



Illustrations: Mahesh Benkar

A The problem is that the screen resolution is too high—reducing it to 1,024 x 768 or 800 x 600 will solve your problem. Since you're using Red Hat 9, you don't have to worry about adding extra parameters to the XF86Config file—this was the only way out with previous Red Hat versions. Red Hat 9 has an excellent GUI configuration tool called 'redhat-config-xfree86' that can be invoked by typing the same at the command prompt. You can also type it in the dialog box that comes up after clicking on the Run... option under the Main Menu, or go to ***Main Menu > System Settings > Display***. Adjust the resolution using the drop-down box, and then restart the X server by either logging in again, or by using ***[Ctrl] + [Alt] + [Backspace]***. This will solve your problem.

Adding more cards

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

Tathagata Ray

A Sorry, your motherboard does not have an AGP slot, so you're stuck with the integrated graphics chipset. If you want, you can install a PCI video card such as a TV-tuner card to get better graphics. For a better sound solution, you can use an add-on PCI sound card, and all you need to do is disable the on-board sound card from the BIOS.

Windows does not provide a reliable utility to check the RAM clock speed, but you can see it when you start your system. At the first screen, where you see the RAM count taking place, you can also see the RAM clock speed. Another option is to use a freeware utility called WCPUID (***www.h-oda.com***), to see the RAM clock speed.

Driver shop

Q. Two months ago, I bought a new PC with a Pentium 4 2.4 GHz processor, 512 MB of DDR RAM, an 80 GB Seagate Barracuda, on an ASUS P4S533 MX Motherboard. I bought an nVidia Riva TNT 2 graphics card with 32 MB of video RAM. I want to know whether my card supports OpenGL. Also, my ASUS motherboard has the SoundMax Sound chipset. The drivers provided with the motherboard CD are incorrect. Where can I get the latest drivers?

Anshuman

A The nVidia TNT2 card that you have on your PC has full support for OpenGL. Install the latest drivers from ***www.nvidia.com*** for maximum game performance. For better performance, we suggest a new generation graphics card, based on the GeForce or Radeon chipset.

You can get the latest SoundMax drivers from ***http://www.asus.com.tw/support/download/item.aspx?ModelName=P4S533-MX&Type=Latest.***

Long story short

Q. I recently upgraded my home PC, taking your advice for the latest motherboard, processor and graphics. My configuration

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

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

In the BIOS setup (AMIBIOS New Setup Utility 3.31a), the current values set under the 'Frequency / Voltage Control' submenu are as follows:

Spread Spectrum: Disabled (other available options: ±0.25, ±0.5, ±0.75), CPU FSB **Clock:** 280 MHz (100 to 280 - in steps of 1)
CPU Ratio: Auto (x6.0 to 12.0 - in steps of 0.5, 14.0, 15.0, 12.5x13.0)
CPU Vcore (V): Auto (1.625, 1.650, 1.675, 1.700, 1.725, 1.750)
DDR Voltage (V): Auto (2.6, 2.7, 2.8)
Termination Voltage (V): Auto (1.27, 1.29)
AGP Voltage (V): Auto (1.6, 1.7, 1.8)

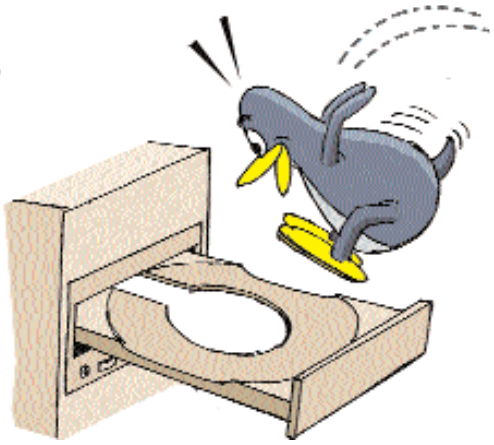
I have also observed that when the CPU FSB Clock speed was set at default value of 100 MHz, the processor was being recognised as an Athlon 1.25 GHz; and when the speed was set at 266, the processor got recognised as an Athlon 2000+, 1.67 GHz. Now the CPU FSB Clock speed is set at the maximum available option of 280, and the processor is recognized as a 2600+, running at 1.90 GHz.

Tell me how to get my processor to work at its designated speed of 2.083 GHz.
S. Sinha

A Wow! Now that's a complete list of specifications if we ever saw one. You certainly did your homework, and all the troubleshooting possible. Here's the dampner—there's nothing wrong with your processor. It's running at the correct speed. There are two versions of the AMD Athlon 2600+ available in the market. You have the latest version with 333 MHz FSB and 512 KB L2 cache; this runs at a clock speed of 1917 MHz or 1.9 GHz. The older models clocked 2.13 GHz, but ran at 266 FSB with 256 KB of L2 cache. Check the AMD processor box, and you will see the clock speeds in the fine print near the bar-code. The Athlon XP 2800+ runs at 2.083 GHz.

Temporary Linux

Q I run Windows XP, and want to know how to run Linux without overwriting XP. Can I run it off the CD without installing it, or do I require a bootable CD?
Mahesh I



A Yes, you can run Linux without installing it. If you have the August 2003 issue of Digit, use the Linux DVD to create a bootable CD of Knoppix—a Linux distribution meant for users who want to try Linux without taking the risk of installing it. Just pop the bootable Knoppix CD into your drive, and boot into Linux. However, you cannot do this with any of the other Linux distributions (Red Hat, SuSE, Mandrake, etc). Once you're convinced that you want to run Linux, take a look at the *'Boots in Control'* article on page 137 of this issue to learn how to install both Linux and Windows XP safely.

Downloading tutorials

Q I want to learn 3D software such as Maya, 3D Studio Max, Softimage, etc. I have visited many of the tutorials sites on the Net, which have online tutorials in the form of Quick Time movies. How can I save or download these movies to view them later?
Sunil

A This is easily done by using such programs as Download Accelerator (DAP), downloadable from ***www.downloadaccelerator.com.*** DAP operates in the background, and traps the Web links that point to these files, thus allowing you to download them. Make sure you're not violating a site's copyright, or breaking any piracy laws by doing this. Read the fine print on the site to be sure.

FAQs

Stop, spam!

Q. Recently, I signed up for e-mail from certain Yahoo! Groups. I provided them with two e-mail IDs, one Rediffmail and one Sancharnet. Now, I get too many e-mails. I figured out how to block these e-mails in Rediffmail, but Sancharnet has no block option. How do I stop them?
Atul Shinde

A. Unsubscribing from a Yahoo! Group is really simple. Just send a blank e-mail to ***<groupname>-unsubscribe@yahoogroups.com***. Here the ***<groupname>*** is the name of each group you wish to unsubscribe from. If the e-mails still don't stop, send a complaint to ***<groupname>-owner@yahoogroups.com***. The group owner will receive your message, and manually remove your address from the list.

Bypass CD-Writers

Q. In your August 2003 issue, you provided Linux distributions. I want to know how to install Linux, as I don't have a CD-Writer. I also want to know how to create CDs for the same.
Sumeet Srivastava

A. To create CDs from the DVD, you have to use CD-burning software such as Nero, and use the 'image burn' feature. To burn an image in Nero, go to ***File > Burn Image***. To burn CDs in Linux, you need to use the 'cdrecord' command. For more help on the syntax, refer to the man pages by issuing the ***'man cdrecord'*** command in the terminal window.

Even if you don't have a CD Writer, but have a DVD-ROM drive, you can install Linux directly from the DVD. Visit ***http://www.thinkdigit.com/howto.html*** for a detailed procedure.

The mouse cursor changes to a typing cursor when you move it over a text field

Online forms

Q. I have a PDF form that I want to fill up. Is there any software that I can use? I have Acrobat Reader installed on my machine, but it is unable to write to the file.
Kali Dass

A. Sometimes, a PDF file has special fields—the mouse cursor changes when you move over it. If the form you downloaded happens to have such fields, you can fill it up, print it and fax it. However, you won't be able to save the form, or fax it from your computer.

If the PDF file doesn't have special entry fields, as seems to be the case with your form, your only option is to print it, fill it in by hand and then fax or post it.

Bootable CD

Q. I have problems making a bootable CD. My PC consists of an Intel Celeron 1.3 GHz processor, running Windows 98 and Nero for CD writing. Can you tell me the step-by-step process for creating a bootable CD with Nero?
Pratik Netake

A. Before you start, make sure you have the Windows 98 bootable floppy. Start Nero and press New—close the wizard if Nero starts in wizard mode. Select the 'CDROM Boot' option and set the Bootable Logical Drive to 'A'. Insert the bootable floppy into the floppy drive, and press New. Now copy the data files of your choice to the CD, and finally, press the burn button to burn at the speed you want.

Autorun can't run

Q. I can't use my Digit CDs (September 2003 and October 2003). I get the following error: "mshta.exe file is linked to missing export advapi32.dll: free library". I searched my computer for these files, and found them in the ***\Windows*** and ***\Windows\System*** folders. The older Digit CDs—October 2002 and November 2002—work fine. My PC is an Intel Pentium 4 2.4 GHz with 256 MB RAM, 48 GB hard disk running Windows 98 SE.
Antariksha Das

A. Download a fresh copy of the required DLL file from ***http://www.useyourbrain.co.uk/missing-dll-files/advapi32.zip***. After downloading, copy the same into your ***\Windows\System32*** and ***\Windows\System*** folders. Restart your computer.

Good old PCI

Q. I have an Intel 815 EGEW board, an 800 MHz Pentium III processor, 128 MB of RAM, and onboard Intel integrated graphics. I can't play games such as *Quake III Arena* and *UT 2003*; games such as FIFA 2003 and *Need For Speed HP2* are quite sluggish. I don't have an AGP slot, so I can't install an AGP graphics card. Can I add a PCI graphics card to play these games? If so, please give me a list of the best cards available.
Ravi.

A. Unfortunately, PCI 3D accelerators have been dead for quite some time now. Hardly anybody buys them, as AGP has completely overtaken the graphics card market. You'll really have to search hard to find a suitable card.

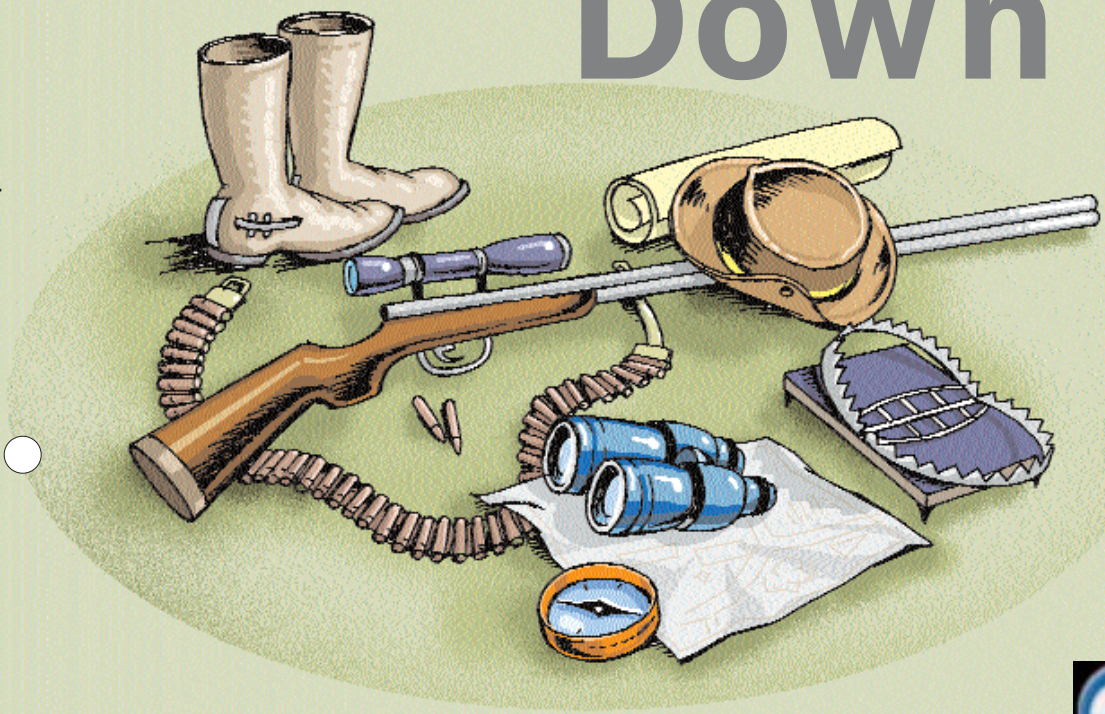
Some time ago, Visiontek offered a PCI card based on the GeForce2 GTS chipset. This would do nicely for the games you wish to play. Another PCI card worth looking for is the PowerVR Kyro. Happy hunting and best of luck!

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!

tips & tricks

Tracking it Down

Sturgeon's Law states that 90 per cent of everything is useless. You know this is true while searching for information online. TnT comes to your rescue with fast and relevant searches that help you defy Sturgeon's Law



Mahesh Benkar

contents

Grokker2
Copernic Agent Basic

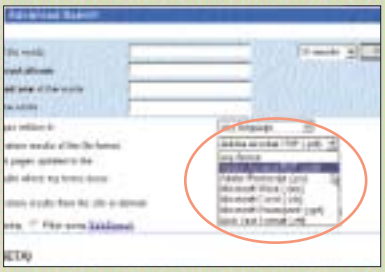
GENERAL SEARCH ENGINES

Illustrations: Farzana Cooper

Google

Think search, and chances are you'll think ***www.google.com***. Here's how we make the reliable horse work better for you.

At Google's home page, if you click on Advanced Search, you can access advanced options that narrow down results to more specific links.



Want more than plain HTML? Look for specific document file types

Language

You tend to get a lot of non-English results whilst searching. By restricting your search to English sites from the drop-down box, you don't waste time on results you can't understand anyway.

Getting format specific

You can search specifically for, say, PDFs or PPT files. Choose the format of your choice across the six listed on the Advanced page, or exclude the results that return formats that you don't want, by selecting the format and clicking 'Don't'.

Here's a word

If you usually look for specific words in a Web page, fine-tune Google to do just that. Use the Occurrences option that lets you specify where you want to see the search terms, whether in the text, URL, title, or anywhere else in the page.

Domain*ing* it

The Domain option lets you limit searches to a particular domain, or avoid bringing up results from it. Fill in the domain box with a Web site that you want to restrict results to, and select Only, or avoid picking up results from, by selecting Don't from the drop-down box.

Page*ing* specifically

The options under the Page-Specific Search heading allow for quickly locating pages that offer services, or have content similar to that of a specified Web page. For instance, if you enter 'space.com' (a site for astronomy enthusiasts), the similar pages listed include some from NASA as well as Sky and Telescope magazine, and several other well-known space-enthusiast sites.

Preferences

If Google is your tool of trade, it makes sense to tweak it to your quirks—head to Preferences on the main page. If you want your browser to remember your preferences, you need to set it to accept cookies—***Tools > Internet Options > Privacy*** for IE.

Language, please

You can choose to restrict searches to only English pages, but remember Google also provides a reasonably accurate translation of pages in five listed languages—German, French, Spanish, Italian and Portuguese. Also, you may occasionally need results that are listed in another language—say, if you're researching French poetry. If you only need English results, set it from the Advanced Search page instead.

Numbers and pages

You can set the number of returned results on a single page, and the way in which

Google Keywords

Keyword/ symbol	Usage	Action
[+]	***Chevrolet +Camaro***	Looks for documents containing both 'Chevrolet' and 'Camaro'
[-]	***Chevrolet -Camaro***	Results will contain 'Chevrolet' but not 'Camaro'
[~]	***~transducer***	Searches for the term 'transducer' as well as its synonyms
OR	***May OR June***	Results will have either 'May' or 'June', or both
Cache:	***cache:http://www.yoursite.com/***	Returns Google's cached pages of ***www.yoursite.com***
define:	***define:virus***	Gives the definition of the word 'virus'
site:	***Apple site:www.food.com***	Will restrict search to pages containing 'apple' only at ***www.food.com***
related:	***related:www.greatvacations.com***	Will fetch results of sites similar to ***www.greatvacations.com***
info:	***info:www.sweepstakes.com***	Will present information that Google has on ***www.sweepstakes.com***

For more search terms check out ***http://www.google.com/help/operators.html***

results are opened—under 'Number of Results', select a number from 10 to 100 from the drop down box. Obviously, the larger the number, the more time it will take for the results page to load. Tick the Results Window checkbox to open search results in a new browser window.

Content censoring

To ensure that search results do not turn up explicit sexual content, use the SafeSearch option. This can be set under SafeSearch Filtering. Choose from three levels—no filtering, moderate filtering that only blocks explicit images, and strict filtering for explicit text and images.

Make sure all your searches are safe for the family

All across Google

Once set, your Google preferences are maintained throughout all of Google's services, so between general searches and Google Groups, there are no differences in settings.

AltaVista

AltaVista (***www.altavista.com***) has powerful search capabilities under its plain and simple skin. It's one of the older engines around, but still comes with a bounty of features.

Truly fast searches

While AltaVista is fast, nothing's ever fast enough! If you want even faster results, switch over to the text-only version at ***http://www.altavista.com/web/text***. It's plain and simple, with no graphical elements to spice up and slow down the page.

Advanced search

Advanced Web searching is accessible from the main page. You can build up queries using exact phrase matches, as well as by the presence or absence of keywords across a page. This is possible from the 'Build a query with...' option.

If you'd prefer Boolean operators, the option is available under 'Search with...'. Use keywords such as 'AND', 'OR', 'AND NOT' and 'NEAR'. 'NEAR' is used to specify that two terms should be located close together—within 10 words—as in ***'iit NEAR admissions'*** for a search on 'IIT admissions'.

The true strength of AltaVista is its Advanced Search

Advance advanced

Other Advanced Search options trim your searches. 'Date' will limit the date and time-range of the Web pages you are looking for and 'Filetype' will let you specify the formats. You can also limit searches to specific top-level domains or site domains. Site Collapse, if enabled, will display a maximum of two results per site. If disabled, it will show you all results, grouped by relevance. Results from the same site are indented beneath the first result.

Advanced? Not quite

If you prefer the query-building tool, check out the 'More Precision' version of AltaVista at ***http://www.altavista.com/?qbmode=***. You don't get all the advanced features, but you do have access to the query-building options.

Wildcarding

AltaVista supports wildcard characters; use [*] to get search results based on variations of words. This is how it works: there have to be at least three letters before the [*] sign. Remember, any letter or letters can take the place of the wildcard character, so a search for 'Micro*' can result in 'Micro', 'Micron', 'Microsoft', 'Microscope', 'Microscopic', and so on.

Preferences

Click on Settings on the main page to set your preferences. You can choose to set language settings (English or

AltaVista Keywords

Keyword/ Symbol	Usage	Action
AND	***Custard AND Apple***	Looks for pages containing both the words (any order, anywhere in the page)
OR	***Custard OR Apple***	Looks for pages containing both the words, if not at least one
AND NOT	***Custard AND NOT Apple***	Results served up contain 'Custard', but not 'Apple'
[*]	***Col*r***	Looks for pages containing both 'Colour' and 'Color'
domain	***domain:edu***	Finds documents from the ***.edu*** domain
Image	***image:boating***	Finds pages that feature an image called boating
Like	***like:ebay.com***	Finds sites that are similar in content to eBay, the auction site

See the complete list at ***http://www.altavista.com/help/adv_search/syntax***

Spanish), or access the Family Filter page. For Web searches, set the options for displaying Web page information, the number of results to be returned per page, as well as browser language troubleshooting, should you have trouble with junk text being displayed.

Parlez-vous Français? Babelfish to the rescue...

Filters

AltaVista takes explicit content very seriously; by default, all family filtering against sexually explicit content is turned on. You can access it at ***http://www.altavista.com/web/ffset***. You can choose the sort of filtering, whether restricted to image video and audio searches, for all or no searches. To enforce this, you can also protect the settings with a password.

AltaVista other searches

You can also search for more than just Web pages—think images, MP3 audio, video and news. Like the Yahoo! Directories, AltaVista too has a directory that you can use while searching for information. The Image Search has limited options, in terms of size and colour; however, it is very fast.

Cool tools

While not in the traditional realm of search, these tools will undoubtedly help you while you work on academic research.

Babelfish

AltaVista's coolest tool has got to be the Babel Fish Translation engine (***http://babelfish.altavista.com/babelfish/***). It's reasonably accurate for general use, and lightning fast—be it a few lines of text, or an entire Web page. Enter the text in the blank text block (up to 150 words), or enter the URL of the Web page you want translated in the URL box, to get it translated to the language of your choice.

Converters

With AltaVista around, you don't have to dip into your pocket calculator for any quick mathematical conversions. Use AltaVista's quick converter functions to help you work between conversions—for example, entering ***'convert 1 in'*** at the AltaVista search box will give you all the metric and imperial equivalents of 1 inch. So, you can convert time by using ***'convert 45 sec'***; convert speed by typing ***'convert 1 mach'***; do temperature conversions by entering ***'convert 40 F';*** convert weight using ***'convert 170 lb'***; do area conversions by enter ***'convert 25 acre';*** and do cooking volumes conversions by typing ***'convert 1 gal'***.

METACRAWLERS

Mamma

Claiming to be the mother of all search engines, Mamma ***(www.mamma.com)*** gives fast results for your queries. And it's got some pretty cool advanced features as well.

Search operators

Search operators make life a little simpler when you're searching through reams of pages to locate elusive information. In Mamma, you can use both mathematical operators, as well as Boolean operators, to separate the wheat from the chaff. Here's how.

Refining your search

Mamma provides a pretty nifty service called 'Refine Your Search' that provides links to further sub-topics within a search. This feature provides more specific topic searches. If you input a general query, such as ***'Linux kernel programming'***, the refine search options will include 'kernel programming' as well as 'Linux device drivers'.

Mamma search keywords

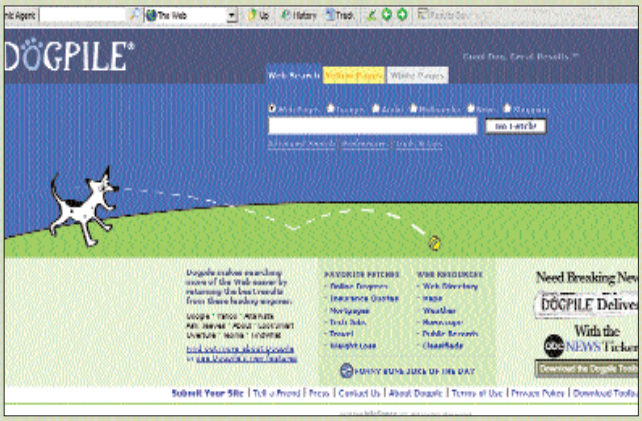
Keyword/ Symbol	Usage	Action
AND	***watch AND casio***	Looks for pages containing both the words (any order, anywhere in the page)
OR	***watch OR casio***	Looks for pages containing either of the words, if there are no results with both the words
NOT	***watch NOT casio***	Results served up contain 'watch', but not 'casio'
[+]	***watch +casio***	Looks for pages containing 'watch' and 'casio'.
[-]	***watch -casio***	Results will contain 'watch' but not 'casio'
" "	***"casio watch"***	Results will have the exact phrase 'casio watch' present, and in this order.

Even more refinements popping up, thanks to good ol' Mamma

Jeeves, About, and other search engines at a single go.

Web search

Dogpile's Web Search is simple and easy to use. You can pre-refine your search by choosing between Web searches, images, audio, multimedia, new and shopping. This will limit your results to those categories.



Use Dogpile to sniff out elusive Web pages

Power search

Use the Power Search option found on the main page to fine-tune your search. Here, under 'Select search sources', you can select the directories and indexing engines to be used by Windows. Under Pay-Per-Click, you can safely choose to ignore all the options, since the results displayed here may not be relevant to your search. Set adult content reduction, if desired, and other options such as highlighting search terms. Also, set the other options for speed, number of results displayed (keep it low for fast page loading), descriptions, and whether you want the results to open in a new window.

Dogpile

Another of those massive Web crawling search engines, Dogpile ***(www.dogpile.com),*** gives you results from across a wide variety of search engines. Use Dogpile to search from Google, Yahoo!, AltaVista, Ask

Setting preferences

Setting the adult filter here will ensure that all your Dogpile searches are filtered. Also, set the other options such as language, automatically correcting misspelled terms—clicking on this will auto-correct all spellings, a feature you may not like unless you make typos often. You can also set the way you want the results displayed. This can be arranged either by relevance, or grouped by search engine. Ideally, choose relevance, as this will remove obvious duplicates in the results. However, if you find too few results, it makes sense to view results by search engine. You might also like to have all results open in a separate browser window; this feature can be enabled by checking 'Open Search Results Links in New Window'.

Remember, you need to let your browser accept cookies so that you can save these preferences as default.

Advanced search

Dogpile's advanced search is accessed from the main page. Start off by qualifying your searches with key terms that you want or don't want listed on the results—the Dogpile advanced search option makes a exact phrase search, as well as a search using either some or all of the listed keywords. You can also use Boolean search terms instead, by using a combination of 'AND', 'OR' and 'NOT'.

More search options

For more search power, you might consider using the domain search option under Advanced Search. You could start with restricting searches to, or excluding searches from, top-level domains such as .com or .edu, or get more specific with specific domains such as Microsoft.com. The 'Last Page Update' option will let you obtain results that were listed before an update on the target date, or you could choose to see results after an update on a certain date.

Audio search

The audio search is a pretty nifty tool. Input search keywords, and you'll get links to audio files that fit the description, or the keywords you entered. And no, this isn't a smart way to start downloading warez; copyrighted content is pretty much non-existent.

Multimedia

The multimedia option is for searching for video files. The results you get are in the formof links to sites hosting video content in a variety of formats.

News, shopping

Dogpile's primary news feeds are culled from ABC News, and they aren't always the latest around, but you can also get feeds from the FAST search engine, with quick, up-to-the-minute results. Shopping is also an option with Dogpile, but it's US-centric, and will, at best, give you an indication of product prices.

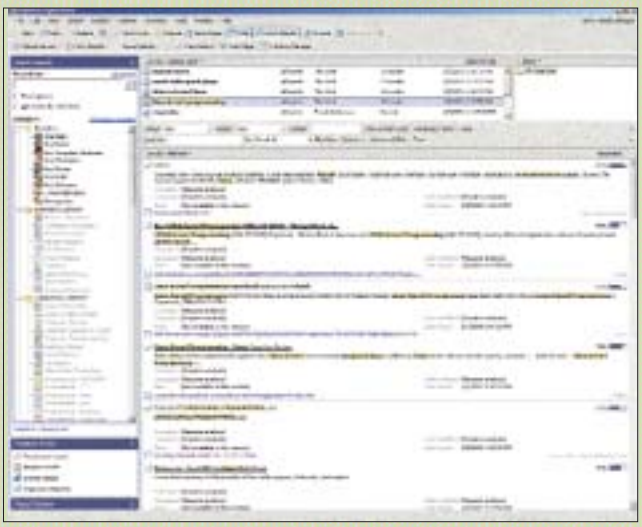
METACRAWLER TOOLS

Copernic Agent Basic

Copernic Agent Basic ***(www.copernic.com)*** is a metasearch tool that allows you to query multiple search engines with a single request. At installation, Copernic adds a toolbar to IE and works with it throughout.

Working smart

You can search from within the Copernic application window, or from the Copernic toolbar on Internet Explorer. The Copernic application window search takes place at the extreme left, and results are displayed in the right-hand bottom pane. All previous searches are listed in the top pane. Click on any of them to open the search results in the results pane.



Copernic helps you perform a smart metasearch

Enabling search engines

The quickest way to look at all the enabled search engines is by clicking on the hot link above the Category pane at the left. By default, this reads '13 engines enabled'. Click on this to select the search engines you want to work with.

Verifying results

Over a period of time, if you are looking at saved results, it makes sense to ensure that all the results still exist. Go to ***Results > Verify Links*** to verify all the links in the saved results.

Viewing results

Your search results are only good if they're understandable. So, if you have a cluttered result pane, click Result Layout to get the results either more detailed or made simpler. With the advanced features in Copernic Professional, you can group results using numerous criteria, but for the Basic version, the common display tool is a good place to start.

Grokker draws a map and delivers visual search results that will make more sense

Grokker

Grokker ***(www.groxis.com)*** is a 30-day trial software that's not a metasearch tool in the traditional sense. It works with the information that it draws from search engines such as Google, as well as shopping sites such as Amazon, and represents the information in visual maps, making the relevance of the search results easier to understand.

Visual mapping

Grokker takes search terms and draws maps; the size of the resultant mapped spheres corresponds to the relevance of the document. When you click a link, Grokker opens up the pages in a browser pane on the right.

Metasearch tools

You can use Grokker to run searches by ranking, sources and domains—commercial, educational, non-profit or other. The slider controls are located at the bottom, and let you tweak these results. You can see the effect on the map drawn. Grokker is an excellent tool to understand the relations between search keywords and analysing the information obtained.

PEER TO PEER SEARCHES

KaZaA (using the KaZaA Lite K++ client)

KaZaA Lite is a popular P2P client software Whether it's music, movies, software or even games, chances are you'll find it on the KaZaA network. The best bit is that you can choose to search using Google, or choose instead to perform a P2P search. Take a look at how to make advanced intelligent searches in KaZaA.

Specialise, specialise

Searching KaZaA is fairly easy. If you've chosen P2P searches over Google search, in the main search sidebar on the left, choose from searching for specific binary files such as music, video files, images, or documents. It makes sense to do an 'everything' search only if you can't locate a specific file.

Timing searches

By default, KaZaA Lite searches for only two minutes. This can give a huge number of results, or none at all—depending on the criteria, the rarity of the file you're searching for and your connection speed. To increase this time, click on Auto Search More (top-left side-bar). You can choose to search for longer for more results, or do continuous search—as clients keep connecting to the network, you should see more results.

Audio searching

Here's the quickest way to locate the right audio file in KaZaA. First, select P2P search and choose the Audio option. Once done, keep the default 'All' option checked, and enter the artist's name and song. Sift through the multitude of results by clicking on 'More Search Options'. Now, you can choose to refine the search by the 'quality' and 'integrity' ratings to ensure that you get the best download from the lot.

Family filtering

To keep the 'U' rating on your P2P searches, you can set in search filter limits. These can be accessed by clicking on Search Filter on the sidebar, or by going to ***Options > Kazaa Lite K++*** Options and flipping across to the Filters tab. You can set the filter here, and choose from pre-configured modes that filter adult content. Optionally, all such filtering can be password protected. You can also choose to filter suspicious file types, based on file extensions.

DATABASE SEARCHES

Articles and extracts

A good place to start searching for articles online is ***www.findarticles.com***, now owned by LookSmart. FindArticles stores article listings across many genres such as automobiles, art, computers, computing technology, etc., from as far back as 1998.

Searching for articles

The 'Advanced search', accessed from the main page, is limited. However, the site still features listings on many arcane subjects with substantial results. For a narrowed-down list, search from the magazine genre drop-down list to the right.

You can also tweak the search here with searches for exact phrases, or the presence (or absence), of keywords.

Directory

As you search FindArticles, you can see the directory from which you're receiving the results. To narrow in on a source, inspect the source publications.

Papers online

One of the biggest repositories of papers online is ***www.itpapers.com***. With links to over 25,000 whitepapers on diverse topics, this site can be invaluable as a central listing for research papers. Search here is, unfortunately, limited to plain searches, with little tweaking possible; however the site main page

Use Find articles to locate documents from as far back as 1998

back in time, the cyber way. The Way Back Machine, located at ***www. archive.org*** (mirrored at ***http:// archive.bibalex. org***), is the super-repository for all that was there, and may not exist anymore.

lists the groups into which the papers have been distributed—whitepapers on Linux, for instance, are accessible under ***Platform/OS > Linux/Open Source.***

Going back in time

If you're searching for a page that existed and was updated later, or was taken off the Internet, there are a couple of nifty tricks for accessing it.

Google caching

Use Google's caching feature to access sites that are unreachable, or have recently shut down. Do this either by searching for the site on Google and clicking on the 'Cached' option, or by typing ***'cache:www.somesite.com/somepage .html'***.

Note that Google typically caches a recent copy of the Web page as it crawls the Internet, so looking for really old versions of a page may not be possible with Google.

The WayBack Machine

This is how you get years

Advanced search

Click on Advanced Search to launch the WayBack Machine's advanced search page. You can specify the URL of the page you want retrieve and its time (month, day and year). You can retrieve pages dating from 1996, although there won't be every version of the page; most will be cached, depending on popularity.

Go back in time to search for now-defunct pages using the Wayback Machine

Other great features

The WayBack machine also offers you options such as comparing two versions of Web pages. In case a Web page has several similar cached versions, you can choose to see all versions, or just one. You can also choose to generate a PDF of a Web page.

For more than the Web

There's more than just text at ***www.archive.org***. As one of the Internet's premier indexing and archiving organisations, you can also access a large amount of statistical data, free historic videos, and free high-quality audio that spans the Internet age.

Usenet

There's nothing like the Usenet to access information from peer groups and people from across the world. At one time, the biggest source for archived posts, in the Usenet community, used to be ***www.dejanews.com***. But after Google took it over, all archived Usenet posts are located at Google Groups (***http://groups. google.com***)

Advanced Groups Search

The Advanced Groups Search accessible from the Groups page will allow you to locate messages by keywords, exact phrase matches, as well as by newsgroup posted to, subject, author, message ID and language. You can also check posts by message dates—all the way back to 1981. Advanced Group Search also lets you set in SafeSearch filters to prevent adult content from being displayed.

Perform a Usenet search from as far back as 1981 using Google Groups

Directories

Directories are aggregated collections of Web pages and sources of information, under common subject-based groupings. Searches using directories turn up results of similar sites, from where more detailed Web site specific searches can be done.

Yahoo directory

Located at ***http://dir.yahoo.com***, the Yahoo Directory features a wide variety of subjects from which you can search for similar Web sites. Advanced Search options (from the Directory main page), will let you search using keyword and phrase matches, as well as domain, country and language searches, which helps generate results based on narrow, specific searches.

DMOZ

The Open Directory Project, located at ***www.dmoz.org*** aims to be the largest human edited directory of the Web, with over four million Web sites grouped across 5,00,000 categories. Advanced searches let you access limited fine-tuning options for a few categories.

Age of Wonders: Shadow Magic

Shades of wonder

Age of Wonders: Shadow Magic (AoWSM) starts off where *Age of Wonders 2 (AoW2)* ended. The game lies hesitantly between a full-blown sequel and a shy expansion pack. Missions serve to both progress the tale, and throw a surprise or two into the works.

Merlin has saved the world, but is swallowed by a portal into the parallel realm of the Shadow World. You're required to step into wizardry shoes, specialise in a school of magic or dabble in multiple disciplines, sketch out the characteristics of your domain, and get buddy-buddy with the 15-odd races that share your world, if not your viewpoint.

Save the world... in 16 scenarios!

AoWSM introduces us to the Shadow Demons—a dark race intent upon feasting upon the souls of the living. The opening cinematic shows the wizards as a hunted lot, persecuted by non-magic people who consider them responsible for the emergence of the Shadow Demons.

The single-player campaign is quite long, with five episodes and 16 scenarios. As a bonus to new gamers, it also includes an in-depth tutorial episode. The game includes 19 standalone scenarios, which are shorter and definitely more fast-paced than the campaign. The game introduces two new races—the roaming Nomads and the mystic Syrons.

Seen here (in a manner of speaking), is the Spirit of War, offering a quest to our hero

Tag, you're It!

Being a turn-based strategy game, the pace is very often tedious. It may sometimes take 20 to 25 turns for a village to transform into a town.

Also, if you build a shrine dedicated to various Spirits, then you'd better have enough resources and a good army to carry out their wishes. The Spirits range from a megalomaniac Spirit of War to an extremist Greenpeace-supporting Spirit of Nature. Their demands can be turned down, but if refused for too long, punishments are quick and severe.

Besides the two new playable races, each race features a new, unique building upgrade and the subsequent unit produced from it. Each of these upgrades allows a unique ability for the city as a whole. The Secret Forest upgrade for the Elves makes their cities almost invisible to enemy scouts and units who mean you harm. A new upgrade available to all races is the Item Forge, where magical items can be custom-built with enchantments of your choice.

This fat pig happens to be the villain of the piece. Doesn't look like it, but trust us. He's evil

The graphics engine is the same as that of *AoW2*. This is where the developers really have their work cut out. Poor graphics come to the fore in the tactical screens during combat. For example, some of the wall-climbing units, instead of scaling walls, walk right through them!

Do-it-yourself adventuring

On a more soothing note, ambient sounds and background music are very good. Additionally, you can load music tracks of your choice for the in-game playlist by copying MP3s into the game's Songs folder, and enabling the Custom Playlist while playing the game.

Like all good Strategy games, *AoWSM* has extensive support for multiplayer gaming. Besides the usual support for LAN and the Internet through GameSpy, the game also features the Play-By-E-mail (PBEM) mode that is unique to the series. PBEM allows players to send their moves to each other in turns, via e-mail. This mode is especially suitable for those with slow dial-up connections, as also for hardcore fans and armchair generals alike, who can continue their games for weeks.

The inbuilt map editor is quite simple to use, and now also features a random scenario generator that adds to the replayability of the game. However, the presence of a little detailed help in this section would have been more than welcome. The scenario editor is far more powerful. You can link scenarios together, spruce up your custom maps with introductions and endings, and import pictures to support your concocted stories.

In the end, *Age of Wonders: Shadow Magic* is still a great game for people new to this genre, as well as hardcore fans, despite the poor graphics.

Genre: Strategy ■ **Developer:** Triumph Studios ■ **Publisher:** Gathering ■ **System Requirements:** 400 MHz CPU, 128 MB RAM, 800 MB hard drive space, DirectX 9.0a ■ **Price:** NA ■ **Web site:** www.ageofwonders.com
Rating: ★★★★☆

MechWarrior 4: Mercenaries

The ultimate formula...

For those who haven't played the *MechWarrior* series, it's a bit of a simulator, first person, third person shooter and tactical operations game, all rolled into one. The tried and tested formula improvised through the years has made this game near-perfect. Kickstart the single-player campaign, and roam the scripted universe as a mercenary for hire. You can choose to be one of four mercenary groups, and depending on which company you choose, you have access to certain types of special Mechs, weapons and privileges. The system is pretty simple—you undertake missions that involve stuff from reconnaissance to all-out gung-ho battles. You complete a mission, you get *moolah*, and once you're done milking a planet, you hyperjump to other planets that have much more milk to, well, milk. And somewhere in the middle of those economies, you can hire and control Lancemates, salvage and buy new tools of total destruction. All in all, by the end of *MechWarrior 4: Mercenaries*, you'll feel great; full of that I'm-oh-so-rich feeling all over your face.

I guess you'd have to call this Black Hawk Down

The mission structure is simple, and even if you lose a mission, you can start right over. The lack of an in-mission save game can sometimes suck. The AI engine is decent and gets the job done convincingly. A Mech's paths are scripted, so play a mission a few times and you know who's coming from where and what's going to happen next.

Merc is an excellent title. It's a game that's easy to get into; pros will feel at home with the depth, and newbies won't get scared by it.

Genre: Simulation ■ **Developer:** FASA Studio ■ **Publisher:** Microsoft Game Studios ■ **System requirements:** 700 MHz CPU, 256 MB RAM, 1 GB hard disk space, 16 MB video card ■ **Price:** Rs 999 (Includes Mechwarrior 4: Black Knight) ■ **Web site:** www.fasastudio.com/games/mechwarrior4
Rating: ★★★½☆

I.G.I. - 2: Covert Strike

I'm A-SASin!

It's been three years since Codemasters released Innerloop Studios' *Project IGI: I'm Going In*. The game features David Jones, a British IGI agent who executed missions involving terrorist factions. *IGI* was innovative in a few ways, including a computer-based map where you could see each and every villain roaming the great outdoors. The game did, however, have its faults, such as the AI, some clipping and texture errors, and the ability to only save between missions.

In *IGI 2*, a number of things have been added, removed, and altered; but while most of the nuisances of the first title have been ironed out, the game still leaves something to be desired.

When *Project IGI* was released,the engine was capable of some nice things, but the whole 'wow' effect was never really apparent. Also, many of the buildings were identical on the inside. In *IGI 2* too, great-looking effects are seldom obvious. Innerloop chose to use their own engine. It looks okay on most accounts, but it doesn't really impress as much as games based on the *Unreal II* engine. This game would be better accepted if it had some of the graphic features of the newly-released *Deus Ex 2*. It would be nice to see per-pixel lighting, shadows that play a larger role, and to be able to shoot out lights. But few games can boast as correct a set of sound effects as *IGI 2*.

David Jones. A man who loves to live dangerously

At the beginning of a mission, you're shown a cutscene that tells you about what, or who, you're after. You're given a small number of weapons, and some gadgets that'll prove indispensable.

Enemies can, at times, hit you from far away, and they work really well as a team—trying to flank you, throw grenades at you, etc.

Multiplayer mode has support only for team-based combat, and when creating a game, you'll get to choose from five very diverse maps. Fighting on a tree-filled mountain one minute, and then hopping over to a Chinese temple-town the next, and with the extensive number of weapons, you should have plenty to play around with.

In most ways, *IGI 2* is a solid game, with no major downsides. However, it's not very innovative. Until a better sequel comes along, you can have a lot of fun playing *IGI 2*, both if you like challenging single player missions, or ducking it out over the Internet.

Genre: Action ■ **Developer:** Innerloop Studios ■ **Publisher:** Codemasters ■ **System requirements:** 700 MHz CPU, 128 MB RAM, 32 MB video card ■ **Price:** NA ■ **Web site:** www.codemasters.com/igi2
Rating: ★★★★☆

PC Toys

Toys R us

If building an in-car GPS navigation system hands-on is your kind of thing, this is a book that will keep you busy for a while. PC Toys shows you how to turn a PC into a toy-train controller, a home-surveillance station, or a watchful assistant that switches on the coffee-maker when it senses that you're awake in the morning. Some of the workshop topics do not involve much hardware fiddling, and a few are a little too simple to be covered in a book like this, but the overall selection is pretty interesting.

The 14 workshops discussed come with complete parts lists, and instructions on how to put it all together with hardware and software. The authors assume familiarity with PC construction, so they don't get into the details of how you should go about installing the hardware or software, but focus instead on how to put it to use. The workshops are written in simple straightforward language and are backed up with reasons and alternative approaches, where appropriate. The bundled CD-ROM contains at least trial versions of most of the software used in the book, as well as a PDF copy of the book itself.

The basic PC that these projects need is fairly low on specifications, ranging from 350 MHz upwards, so you could implement most of these projects pretty much using any PC. However, while it's hard to beat the 'cool'-ness of topics such as 'Create and Control Your Own Robots' or 'Build A Telescope Tracking Station', it's equally hard to find the appropriate gear to get from scratch to a toy station. Since the book is inevitably US-centric, the generously sprinkled Web links for component-sourcing lead to Web sites that are mostly only useful to gawk at.

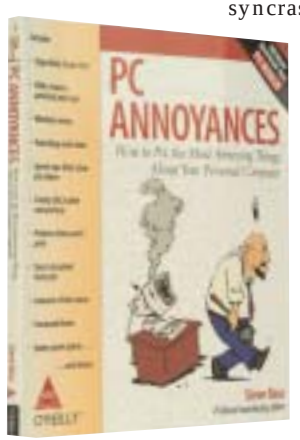
If you can get past that barrier, this is a well-put together book that promises many days of merry tinkering!

Publisher: Wiley Dreamtech India ■ **Authors:** Barry Press and Marcia Press ■ **Phone:** 011-23260877/ 70877 ■ **Fax:** 011-23275895
■ **E-mail:** wdt@vsnl.net ■ **Web Site:** www.wileydreamtech.com ■ **Price:** Rs 329
Rating: ★★★★☆

PC Annoyances

Get smart

Written by *PC World's* contributing editor, Steve Bass, this book is an informative volume, packed with smart tips and workarounds for those niggling problems you've stoically borne; perhaps because they sounded too silly. Sadly, it forgets to keep in mind the global user, and focuses on American users.



The book is peppered with hilarious toons across its seven sections. The e-mail section is the first, and bears tips to help you fight spam as well as tweak your favourite e-mail clients such as Outlook Express and Eudora, Hotmail and a (redundant for Indians) section on America Online (AOL).

Next up are Windows XP tweaks that should get rid of a few Redmond idiosyncrasies. The Internet section that follows has smart ideas on making sense of your bookmarks, and using Google. Here, the Instant Messenger (IM) sections could have elaborated on MSN, with less emphasis on AOL Instant Messenger (AIM). The Office section has its share of a healthy set of tips for Word, Excel, PowerPoint, Outlook and Outlook Express. Another gem is the section on Windows Explorer, which is higly recommended for anyone new to Windows XP.

The sixth section deals with music, videos and CDs, and has tips put a first-timer at ease. Finally, the hardware covers tips on DSL and cable modems, LCD displays and printers, among others. The tips come richly-illustrated by captioned screenshots, and the language is light and witty, making for a relaxed read.

Perhaps its greatest feature are the tip-by-tip software utilities that can be downloaded from the company Web site (***www.oreilly.com***). It's a book with some hidden gems for the advanced user, but is more oriented at those who've been frustrated and let down by techical support. Just one grouse, though—for the price at which it retails, all the software should have been bundled into an accompanying CD. Without that, it's recommended for novices who've just wet their feet and burnt their fingers, or anyone who didn't have someone to turn to.

Publisher: Shroff Publishers and Distributors Pvt Ltd ■ **Author:** Steve Bass ■ **Distributor:** Shroff Publishers and Distributors Pvt Ltd
Phone: 022-22070989 ■ **Fax:** 022-22623551 ■ **E-mail:** cbsbom@giasbm01.vsnl.net.in ■ **Web site:** www.oreilly.com ■ **Price:** Rs 225
Rating: ★★★½☆

The Case of the Two Additional CDs

A Hercule Poirot mystery

CHARACTERS

Saurabh Kumar: *CD-Content coordinator,* ***Upendra Singhai, Srinivasan Ramakrishnan:, Ram Mohan Rao, Rahul Singh:*** *Writers,* ***Sumod Hajela*** *: Assistant Editor ; Sunil Patil: Designer;* ***Garfield D'Souza, Robert Sovereign-Smith:*** *Copy Editors;* ***Hercule Poirot:*** *World's second best-known detective*

Setting: *Digit Command Centre, Navi Mumbai*

Date: *January 3, 2004* ***Time:*** *3:35* PM

Prologue: For 15 days since December 19, 2003, Saurabh Kumar dreamed of a well-deserved four-day vacation after packing off his two regular CDs to Singapore to be mastered. His foresees four days of just doing more research on the Internet, a time of peace and quiet. In short, the birds were singing, the sun was shining and all was right with Saurabh's world. Just then, Sumod calls out to him...

Sumod: Houston, we have a problem. *(Saurabh's smile fades; he waits for the sledgehammer to strike his head)*

Sumod: We have two more CDs to pack in for our February issue. You have to pack in the world's best-known games, and the world's best-known audio-video tutorials. And yes, I want a new design. All in nine days. *(Saurabh's smile has now faded entirely. The sledgehammer did not take too long to strike).*

Saurabh *(to himself)***:** Wait till I blast him on multiplayer *Quake III*. One BFG, and he's vapourised. Two new CDs in nine days! What does he think I am? Superman? *(And then, the idea strikes. Why not?)*

Cut to January 15, 2004. *The Digit Command Centre is aghast. How could this happen? How could Saurabh do this? All for just two additional CDs?*

Enter Hercule Poirot. He has been at the Digit Command Centre since January 12 ever since the execution happened. He was called in specifically to investigate the unprecedented incident.

Poirot *(to all present)***:** *Eh bien*, I have the answers with me. Lend me your ears *(Poirot was not the one to miss the dramatic opening line)*. Here, let me present to you the exhibits and the suspects.

Here follows Poirot's monologue (in authentic French-Belgian accent): *Mon cher* Saurabh, you said you executed the plan with NASA-like precision *(Saurabh nods; he has no defence)*. But you also had accomplices, yes? *(Saurabh nods again)* It has not happened in the history of technology magazines before—this kind of planning put into one execution, this kind of meticulousness. So much so, *mon ami*, there is not a single shred of evidence left. But Hercule Poirot is no ordinary man, he finds what even a microscope cannot. You, *Monsieurs* Upendra and Rahul, you too were his

ILLUSTRATOR: Mahesh Benkar

chief accomplices. It was only when *Monsieur* Srinivasan got a whiff of the scheme, that he joined in, did he not?

Saurabh *(interrupts)***:** But Mr Poirot, there were also Sunil and Ram. This execution could not have been done by just three people. If I have to take the blame for all this, I better take everyone with me. And Ram did not even listen to his family who had come to meet him from down south.

Poirot (frowning): *Monsieur* Saurabh, I implore you to not disrupt my train of thought. The grey cells, they know it all. One just has to employ them. Your MP3 logs say that *Monsieur* Rahul from *Developer 2.0* magazine was playing Jagjit Singh *ghazals* even as you were doing it. Updendra was surfing the Internet, Srinivasan was downloading the incriminating data. And Ram, it was he who came back from home late in the night, only to do this. And these gentlemen, you instigated them, you brainwashed them into doing it.

The evidence is for all to see, *mon cher*. The telephone calls, the e-mails, the meetings to execute the plot, all point to one thing—you did it. You planned this for nine days. Now, *Monsieur* Saurabh, tell me, what do you have in your defence.

Saurabh *(hanging his head, nearly in tears)***:** Yes, yes, yes, I did it. I could not take it any longer. Sumod's words had terrorised me. He made life hell. Two more CDs—1300 MB of data—in nine days. Tell me *Monsieur* Poirot, who in the world has done this? How could I not do such a thing? How could I not get accomplices?

Upendra: Saurabh, we are with you.

Srinivasan: Yes, mate, we are with you. As Axl Rose said, *"Don't cry, baby, don't cry"*.

Saurabh *(in a mood to reveal all, given the evidence)***:** I will tell all. Yes, I asked these guys to join me in the execution. I even asked guys on the copy desk. It was a full-blown team effort. Sunil from the online team even made a design which we later HTML*ised* to create the perfect page. But it was the coffee that instigated us most—all of us. Even Niketu, who was ill, sent his contribution from home. All this while, it was up to me to get everyone going for the execution. And then I had a plan, why not name it? I pestered Sachin, our Features Editor, and he came up with two names—Blitzkrieg, and Sight and Sound. Blitzkrieg was surely a great name for the quick execution we planned. In the end, it was only great music, great table tennis and great food that kept us going. We would have slept through it otherwise.

Poirot: Instead, you put something else to bed, didn't you?

Saurabh: Yes, we put the two more CDs to bed. The permissions came on time, downloads happened fast, the design was scrutinised with great precision. Flash files and HTMLs were generated, content and pictures matched, and finally we burned. The planning was immaculate, the execution perfect. I plead guilty, along with Upendra, Srinivasan, Ram, Rahul Sunil, and copy-deskers Robert and Garfield, to execute these CDs. You may punish me.

Poirot: *Mon Ami* Saurabh, you are guilty, and you shall be punished. Monsieurs Sumod and Sachin, a pat on the backs for Saurabh and team, please.

The curtain falls.

Name the person who christened Linux, and first made Linux available for download using FTP.

a. Marc Ewing

b. Linus Torvalds

c. Ari Lemmke

d. Richard Stallman

2 Jim Kardman named a technology after a little known Scandinavian monarch—King Harald Blatand. What is the technology called?

a. Blu-Ray **b.** Crownpeak
c. Apropos **d.** Bluetooth

3 Who coined the term Cyberspace, in his novel *Neuromancer* in 1984?

a. Sergey Brin
b. Eugene E. Kashpureff
c. Leonard Kleinrock
d. William Gibson

4 During the early design phase for the IBM stretch computer in 1956, the name 'Byte' was coined by?

a. Werner Buchholz
b. Al Shugart
c. Bob Bemer
d. Lorne Trottier

5 In 1971, the southern part of San Francisco, USA, was named Silicon Valley by a journalist. Who was he?

a. Don C. Hoefler
b. Les Vadasz
c. Jerry Rogers
d. Andrew Grove

6 The heart of every Web site is Hypertext, which allows text to branch of into other related text sources. Name the person who coined the word around 1965.

a. Ted Nelson
b. Mark Bernstein
c. Calvin Mooers
d. Peter Grahame

7 The Internet is one of the best sources of information available today. Who called it 'Internet', in a paper on Transmission Control Protocol (TCP) in 1974?

a. Tim Berners-Lee
b. David Graves
c. Vint Cerf and Bob Kahn
d. Fran Allen

8 The Open Source movement has spread like wild fire. Who came up with this name, in 1998, for the free distribution of source code?

a. Richard Stallman
b. Eric Raymond
c. Stephen Shankland
d. Ransom Love

9 Who was the first person to use the term 'packet' for a TCP/IP packet.

a. Bertrand Mahé
b. Michael Doughney
c. David Lynch
d. Donald Watts Davies

10 Who used the term 'Computer Virus' for the first time, to describe a destructive, self-replicating, computer program?

a. Fred Cohen
b. Bill Gates
c. Gene Kim
d. Francis Collins

11 The term 'blog' refers to a free flowing text format that allows the ultimate freedom of speech. Who came up with this term in 1999?

a. Jamie Zawinski
b. Gudni Gudnason
c. Jim Clark
d. Peter Merholz

12 The term 'hacker' was first used...

a. ...in the popular movie *'The Net'*
b. ...in the Annual Linux Conference
c. ...in the Massachusetts Institute of Technology (MIT)
d. ...in C-DAC, India

13 The term 'nerd' was coined to describe people who imagine that they are living in technology. It first surfaced in a children's book called ***'If I Ran the Zoo'***, by?

a. Archie McPhee **b.** Dr. Seuss
c. DJ Sith **d.** Aunt Sally

Answers

Quiz

1. C 2. D 3. C 4. A 5. D 6. A 7. B 8. A 9. D 10. A 11. D 12. C 13. B

Crossword

Across: 1. Centrino 2. Obfuscate 3. SETI 4. Avalon 5. Pel 6. Cookie 7. Flops 8. Google 9. Apple

Down:

did you know

A quarter inch square chip of silicon has the same capacity as the original 1949 ENIAC computer, which occupied a full city block. When the ENIAC was first turned on, the lights of the entire city dimmed.

numberette

The **Google index** is so big that if you read **1 page** a minute, it will take you **6,000 years** to read it all!

digit QUOTIENT

1 to 5 Way to go...

6 to 10 Good, if you like being mediocre

11 to 15 Your next job could be with us!

Got an interesting question? Send it in with the correct answer to quiz@thinkdigit.com

Across

1. Intel's Wi-Fi ready efficient mobile technology for laptops
3. An ongoing effort in search of extra terrestrial intelligence
6. Presentation sub-system of Longhorn
7. The smallest element that a printer can print, comparable to pixel on screen
8. You can't eat this one, but Web sites use it to store preferences

Down

2. To encrypt source code in a way that makes it obscure, or unclear
3. The latest serial IDE interface
4. 1 followed by 100 zeroes
5. Movies that bomb, or a measurement of computer speed
6. Forbidden fruit? The company that publicised the mouse