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SEPTEMBER 7, 2004

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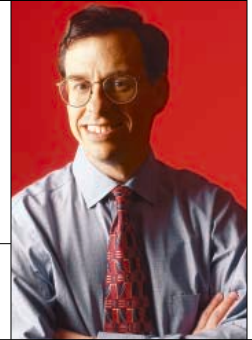
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Forward Thinking

Waiting For Windows

It seems like we've been waiting for Windows for the past 20 years, starting with the very first version that was, famously, years late. A decade ago, we were waiting for Chicago, later known as Windows 95. And the object-oriented user interface promised for Cairo simply never materialized, although Windows NT 4 was a big step forward.

So here we are again. This time we're waiting for Longhorn and its new user interface, better file system, new security technology, and improved programming model. We in the press get the story from Microsoft and tell our readers about the company's plans. We know this feeds the anticipation and is all part of the hype, but we also know that our readers like it. So in this issue, we report on an operating system that won't even be in a prerelease version until next year and won't ship until 2006—at the earliest.

Plenty of people need to think about Longhorn now, though, especially developers and those involved in corporate deployments. And, of course, we have the enthusiasts who need to know where the OS is heading, just because it's cool. But sometimes we get so caught up in the next big thing that we forget to look at the here and now.



The Windows world already has lots of unique utilities that do things like change the look of the interface (my favorite is Windows Blinds) and that add searching (like X1). Utilities can enhance and change the way we work today, so we don't have to wait for an operating-system upgrade that is two or three years away.

Just as important, while a service pack will never get the press that a new version of Windows will, XP Service Pack 2 deserves your attention. It is a long-overdue and necessary improvement to Windows security. Whether it will be enough is hard to say, because expectations are so high and the threats are so great. As many Windows users as possible should upgrade, if only to reduce the number of machines used as drones by malicious software.

My advice is to consider what's coming down the road in a few years as well as the alternatives available today. After all, working with large amounts of data, managing large applications, and dealing with an ever-growing number of security threats are problems many of us deal with every day. Waiting for Windows won't make them go away.

Sometimes we get so caught up in the next big thing that we forget to look at the here and now.

E-Mail: More Solutions, More Threats

The biggest pain point in computing these days is the e-mail mess. We have spam, viruses, and e-mail overload, and dealing with it all is only getting harder. Some people think e-mail is broken beyond repair, soon to be replaced by instant messaging, RSS feeds, and blogs. IM is great for real-time communications; RSS is a fine way of gathering news headlines; and blogs are an effective way to post public information. But none of these technologies can replace e-mail.

Meanwhile, the threats that are plaguing e-mail are already starting to show up on these new services. If you haven't yet gotten any spam instant messages

(called "spim"), odds are you will. We're also seeing viruses starting to spread on IM and phones.

That's the bad news. The good news is that solutions—both behavioral and technological—are out there. We need to teach people never to respond to spam and to understand that legitimate companies won't ask for credit card information via e-mail. On the antispam front, perhaps the best news is that the big e-mail senders—AOL, EarthLink, Microsoft, and Yahoo!, among others—have created a set of antispam best practices, including standards for dealing with e-mail authentication. The idea is that your ISP



Forward Thinking

MICHAEL J. MILLER

It seems silly to prevent individuals from listening to our voice conversations but not our e-mails.

will easily be able to sort legitimate senders from spammers and track down the worst spam offenders.

Proposals such as Sender Policy Framework (SPF) and Microsoft's Sender ID suggest ways to check whether the physical address a message comes from matches the message's domain address. In other words, the proposed technologies would match the IP address with the Domain Name System (DNS) address and flag messages that didn't seem right. That's important because "domain spoofing" is responsible for more than half of the spam out there today. And this spoofing is instrumental in many phishing scams.

But even this level of authentication will not end the spam problem entirely. Spammers are resistant

and will come up with new tactics. Soon we'll need to replace the authentication systems with better key-based systems. And of course, we need continued improvements in areas from filtering to user education.

Another concern is a recent U.S. Court of Appeals ruling that federal wiretapping laws do not apply to e-mail, which makes it clearer than ever that we need to be more careful with our e-mail. Congress should address this, as it seems silly to prevent individuals from listening to our voice conversations but not our e-mails. But more important, people need to increase their awareness that e-mail is often not private, and that they may need to turn to encrypted e-mail to send confidential information.

The Perfect Mail Client

Better mail clients are a large part of the solution to the e-mail troubles. Here's the list of features I think would make a perfect client:

- **Better antispam tools.** Most of today's mail clients come with some sort of antispam filter, but there's always room for improvement. I currently have three levels of antispam software on my corporate mail: a company-wide gateway mail filter, Outlook 2003's built-in antispam tools, and various third-party tools. (Our Editors' Choices are Cloudmark SpamNet and MailFrontier 4.0.) Because spam changes frequently, you need an antispam tool that moves just as quickly, particularly to flag things like phishing scams.

- **Built-in search tools.** Outlook takes much too long to search through e-mail. Instead, I've been

using XI, which creates an index, so searching is nearly instantaneous. Other search products do just as well, including Bloomba (see the screenshots), Creo Six Degrees, and Nelson Email Organizer (NEO).

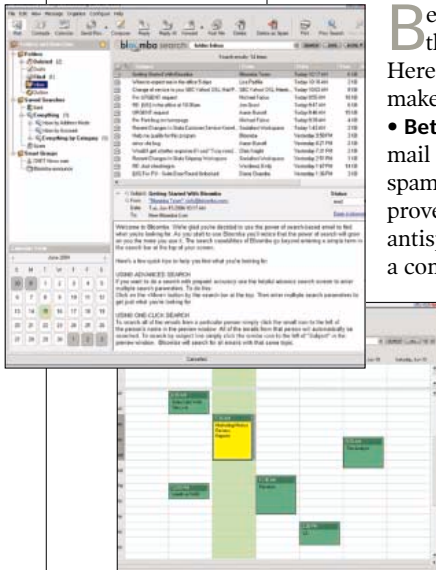
One idea floating around is that with good search

tools, you don't need folders, which require time-consuming maintenance. For instance, Google's new Gmail system offers filters but not folders. But there's something about folders that works better than any system that relies solely on search. Ideally, I would like to have both nested folders and nearly instant indexed searches.

- **Better organization of messages.** Folders have their limits. For example, messages usually live in only one folder at a time, but Outlook adds some nice features such as colored flags and the ability to mark messages for follow-up. NEO, which works with Outlook, goes much further with better indexing. I like a lot of the concepts behind NEO, but it's designed for an Outlook user with a single desktop. Since I use several systems, it's not perfect for me.

- **Better ways to find related information.** One of my favorite things about Bloomba is the way it automatically brings up calendar information related to dates in an e-mail message. But I wish Bloomba supported Exchange directly.

- **Lots of add-ons.** No matter what features a mail client offers, you'll always want more. Everyone needs add-on antivirus and antispam tools. But I also like the ability to plug in different kinds of products, such as FranklinCovey's PlanPlus.



The Law of Large Numbers

As someone who remembers when PCs were new, I'm constantly amazed by how pervasive computers have become. That point was driven home recently when Hewlett-Packard announced that it had sold more than 50 million consumer desktops, including the HP Pavilion and Compaq Presario lines. According to HP, it is the first company to reach that number.

It's interesting to note that the consumer desktop market is smaller than the business desktop market. Research firm Gartner expects that this year will see

sales of roughly 32 million corporate desktops and 15 million consumer desktops in the U.S.

All these numbers add up. By 2010, Microsoft believes there will be more than 1 billion Windows PCs. Anyway you look at it, that's an amazing number.

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27 Editors' Choices

A comprehensive list of our current picks in nearly 100 categories.

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- 36 Archos AV420 Pocket Video Recorder ▼
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COVER STORY

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Are we there yet? Will we ever be? We look at the future of Windows, near (Service Pack 2) and far (Longhorn). Service Pack 2 promises to make Windows XP machines the safest they've ever been, and Longhorn is looking cooler than ever—though its launch date continues to recede farther into the future.

DVD BURNING

104 Double-Stuff DVDs

Dual-layer recording is still problematic, but the industry has made significant progress—and these days, we need the extra storage these drives can provide! We also review the newest 8X drives.



MONITORS

111 Low-Cost Displays



Plummeting prices are yet another reason why LCDs are gaining favor over CRTs. We test 11 17-inch LCDs priced from \$400 to \$535.

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120 The Essential Buying Guide: Business Desktops

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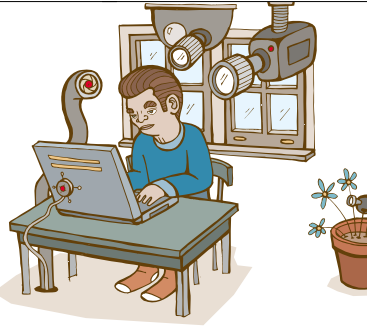
SERVICE-ORIENTED ARCHITECTURE

131 A Better Blueprint for Business

If you want your company to thrive in today's marketplace, you must streamline your infrastructure and get partners, suppliers, and customers plugged in quickly. Here's how.

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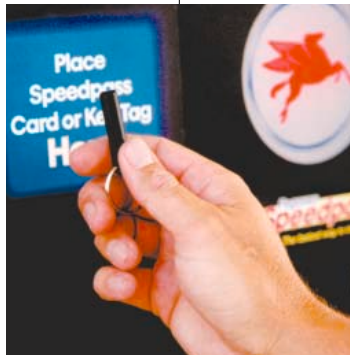
TECHNOLOGY TRENDS & NEWS ANALYSIS

Are You Chipped?

Tagging people and their belongings is the new frontier for radio frequency chips.

DEPENDING ON how closely you guard your privacy, RFID (radio frequency identification) is either a benevolent new technology or Big Brother waiting to pounce. Similar to bar codes, though more sophisticated, RFID tags are small information chips embedded in merchandise and even—in emerging applications—in people. Recently, new RFID applications have been taking shape, including tagging schoolchildren so parents and educators can track their movements. And several big businesses have formalized RFID plans focused on supply chains.

After an RFID chip is embedded, a reader allows the user to access the information on it. In July, Delta Airlines made public its plans to use RFID tags to track luggage, and a school in Osaka, Japan announced that it will put chips in all children's backpacks or clothing. Although RFID chips have been placed under people's skin before, the practice of chipping people isn't widespread. School officials in Osaka made their decision, which has drawn support from many parents, after a series of



crimes against children.

In another closely watched move, the International Civil Aviation Organization has proposed putting RFID chips in over a billion passports and set a deadline of 2015 for the move. Several civil rights groups, such as Privacy International, are protesting.

On the business front, major retailers like Wal-Mart have finalized plans to implement RFID as a means of streamlining inventory and distribution channels. Not everyone is looking forward to that, though. Katherine Albrecht, founder of CASPIAN, a consumer RFID watchdog group (www.spychips.com), raises concerns about every single product having its own unique tag and marketers being anxious to track information about consumers.

Albrecht also notes that if RFID and portable readers become pervasive enough, a criminal, for example, might quickly be able to see the contents of a purse. The emerging question with RFID tagging is how close to home we want it to get.—Karen Jones



Nano Report

England's Prince Charles is eyeing the future of *nanotechnology*. He made a public announcement in mid-July that the Royal Society and the Royal Academy of Engineering will soon publish a risk/reward report on the emerging science at www.nanotec.org.uk/evidence.

"The ability to work at this scale...is a triumph of human ingenuity," the prince said. But he added that proper attention should be given to evaluating the possible risks.

Some critics have warned of nightmare nanotech scenarios, such as armies of self-replicating miniature robots. Charles said such fears "belong in the realm of science fiction," but stressed, among other things, that continuing development could widen disparities between rich and poor nations.—SR

PARTIAL TRUCE Fences are coming down in the instant-messaging (IM) wars. America Online, Microsoft, and Yahoo! recently announced that Microsoft's upcoming Live Communications Server will connect all three companies' IM clients. Only business users will benefit, though.

Cell Phone Fashionistas



CONSIDER CLOTHES that can communicate. Researchers at France Télécom have developed a small, flexible color display that fits in—or on—a shirt pocket. With the assistance of Bluetooth connectivity, it can display images and animations from your cell phone right onto your shirt (see the photo). The electronic components, including LEDs, have been soldered onto a flexible circuit board, and the display is connected to a rechargeable, 4-hour battery. Software lets you use your phone to adjust brightness, draw pictures, and more. Our prediction: Teens, toting their très-cool cell phones, will go for the idea first.—Sebastian Rupley

Phishers Favor Financial Disguises

Phishing—the practice of sending deceptive e-mails that appear to be from a legitimate business in order to obtain private information—has risen to epidemic proportions. Research shows that nearly 70 percent of phishing messages appear to be from financial institutions, such as banks.

Top Industries Worldwide Used by E-Mail Phishers

Financial	68%
Credit card	17%
E-Commerce	12%
Other	3%



Source: Radicati Group, July 2004.

Net Photo Voyeurs

Should the Internet be a photo archive for graphic images deemed too horrific for newspapers and television? Disagreement on that topic—especially between women and men—is pervasive, according to a July report from the Pew Internet & American Life Project.

Researchers conducted phone interviews with 2,200 adult Internet users regarding online availability of graphic images. The survey came just after the widespread press



coverage of the murder of American contract workers in the Iraqi city of Fallujah, the release of the pictures taken at the Abu Ghraib prison in Baghdad, and the streamed video clip of civilian Nicholas Berg's beheading.

Of the respondents, 24 percent reported that they had gone online to view images that were too gruesome for standard media coverage. Only 29 percent of female respondents and 53 percent of males said they approved of the images being online.

"Real human beings are being victimized in these images in a way that is very different from what people see when they play the latest version of *Grand Theft Auto*," says Lee Rainie, Pew's director. There's no photo editor on the Net.—SR

The VoIP Debates

ARE ROADBLOCKS standing in the way of VoIP? Pioneering Voice over Internet Protocol companies like Vonage and old-school telecom companies like AT&T are racing to bring inexpensive VoIP services to consumers, and the number of VoIP users is on the rise. But regulators are at odds over how to tax the services.



Three states are now considering legislation and at least three different legislative proposals are pending before Congress. Regulatory debates in California, Minnesota, and New York inspired Congress to step in to try to head off conflicting state laws.

All of the congressional proposals but one prohibit state governments from taxing and regulating VoIP companies. The Advanced Internet Communications Services Act, however, says that the FCC should require VoIP companies to offer enhanced 911 service and disabled access and pay universal service charges. The IRS and Treasury Department recently made it clear that they are considering whether a 3 percent federal excise tax should apply to VoIP services.

"A patchwork of conflicting legislation would not promote innovation," says John Horrigan, a senior researcher at Pew Internet & American Life Project. Legislators worry that widespread adoption of VoIP services could upset established methods of revenue collection, which would, in turn, threaten the availability of affordable rural telephone service. Meanwhile, VoIP remains one of the most promising emerging technologies, and its use is growing. Look for continuing debates.—John R. Quain

MAIL POLITICS

And you thought all those elections flyers were a nuisance. According to MailFrontier—makers of e-mail security products that block spam, viruses, and other message-based attacks—more than 1.25 billion political spam messages will reach registered voters before the fall elections. From April to June, the company saw a 50 percent increase in political spam and anticipates even greater increases in the 60 days leading up to November 2, Election Day. Seventy percent of the current political spam messages are email polls, according to MailFrontier CEO Anne Bonaparte.

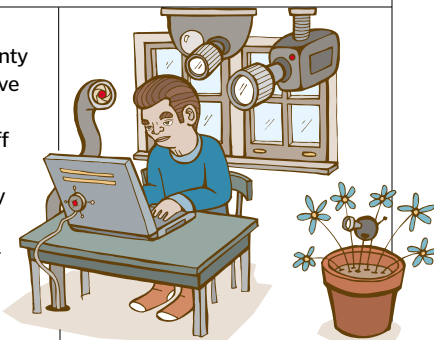
Taking Aim at E-Mail Privacy

ON THE HEELS of the latest flap over Google's plans to scan the e-mail messages of its Gmail users, more news is afoot on the message-snooping front. E-mail privacy rights were called into question by a recent federal ruling stipulating that the federal Wiretap Act does not cover e-mail stored on a mail provider's server. The court upheld the dismissal of a federal wiretapping indictment against Bradford Councilman, former vice president of Interloc, a now-defunct listing company for rare and used books that offered e-mail accounts to its members.

"This undermines what

everyone's thought for twenty years—that you have to have a wiretap order to access e-mail," says Lara Flint, staff counsel for the Center for Democracy and Technology (CDT). Councilman was charged with illegally intercepting and copying e-mails sent from Amazon.com to its members' accounts.

The Federal Wiretap Act was adopted in 1968 and expanded in 1986 to set procedures for court authorization of surveillance of all kinds of live electronic communications, including voice, e-mail, fax, and Internet, in criminal investigations. "The ruling



brings up a range of concerns," says Ari Schwartz, associate director of the CDT. Specifically, it may open the door for more ISPs to scan their customers' e-mail, not only for viruses and spam filtering but for their own gain—and without disclosing their actions to users.—Molly K. McLaughlin

VIDEO POSSE A group of movie studios, consumer electronics companies, and chipmakers has formed the Copy Protection Technical Working Group to devise ways to share high-definition video content while defying pirates. Disney, Intel, Microsoft, and others are on-board.

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COMING ATTRACTIONS



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A Pocket PC in Every Pocket

If you're in the market for a Pocket PC, HP's got you covered. The completely revamped iPAQ family will include four different series aimed at different types of buyers. The HP iPAQ Pocket PC h6300, an HP/T-Mobile collaboration, is an all-purpose communications tool. The first Pocket PC with integrated 3-way wireless capabilities (GSM/GPRS, Wi-Fi, and Bluetooth wireless technology), the h6300 lets you type e-mail and text messages and access the web via a snap-on thumb keyboard. Or you can take pictures with the built-in camera.

Other iPAQ models will include the rx3715 Mobile Media Companion for enjoying your music, photos, and video wherever you go via WiFi.—*MEB*

iPAQ h6315 Pocket PC, \$499.99 direct; iPAQ rx3715 Mobile Media Companion, \$499.99. Hewlett-Packard Development Co., www.hp.com.

Two Lenses for the Price of One

The second generation of Samsung's innovative still/video camera

combo has arrived, the Duo-Cam SC-D6040. By stacking a dedicated 680,000 pixel, 10X optical zoom digital video (DV) lens and a 4.13-megapixel, 3X optical zoom digital still photography lens into one body, the DuoCam lives up to its name and provides great shooting flexibility. A 2-inch LCD screen and a color LCD viewfinder help you see what you're capturing onto flash memory (Memory Stick/Pro, SD/MMC) cards and Mini DV tapes. USB 2.0 and IEEE1394 ports are included for fast file transfer.—*MEB*

\$899.99 list. Samsung Electronics America Inc., www.samsungusa.com.



Mini Boom Box

Unplug those ear buds and share the love with Harman Multimedia's JBL On Tour speakers. A bit larger than your sunglasses case, JBL On Tour is the perfect companion to any digital music or portable CD player, thanks to a pair of Odyssey transducers and 6 watts of total power. Four standard AAA batteries provide more than 24 hours of boom time. The Ontar speakers work with the Apple iPod and other MP3 players and desktops.—*MEB*

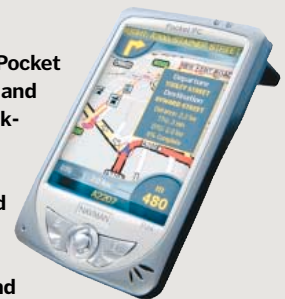
\$99.95 list. Harman Multimedia, www.jbl.com.



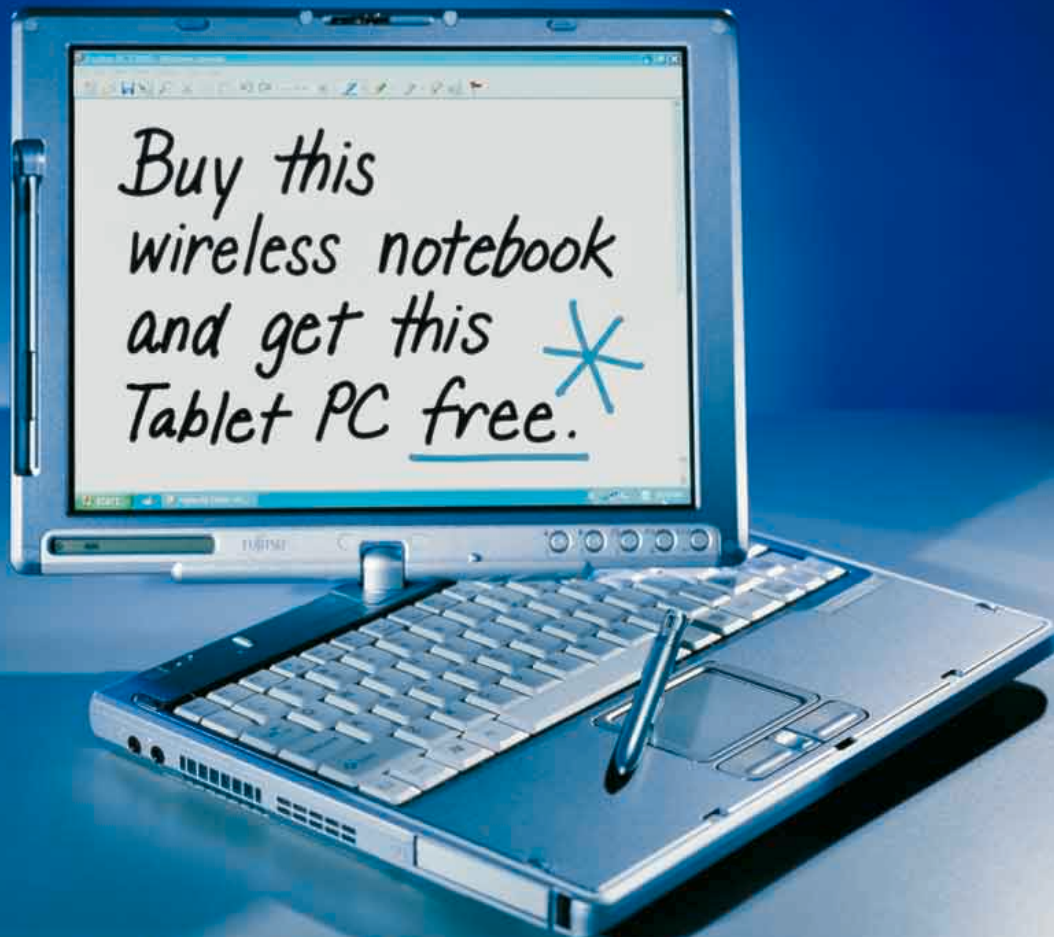
Dude, Here's Your Car

The Navman PiN is a full-featured Pocket PC PDA with a built-in GPS receiver and Navman's navigation software package. The PiN provides address-to-contact routing, a ZIP-code search tool, complete route summary, and a 3D-map display option on the unit's 3.5-inch color TFT LCD display. Other features include day and night screen modes and voice guidance.—*MEB*

\$499.95 list. Navman USA, www.navman.com.



For more new products see www.pcmag.com/productbulletin.



Fujitsu recommends Microsoft® Windows® XP Tablet PC Edition for versatile mobile computing.

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Presenting the Fujitsu LifeBook® T3000 Tablet PC. A unique combination tablet and notebook that gives you the best of both worlds, all for the same price as a standard notebook. The LifeBook T3000 Tablet PC sets a new standard for mobile versatility and convenience. When you need a sleek, high-powered notebook, simply open it up and use its full-size keyboard. Or, when you want to sketch, write, or take notes, pivot and secure the screen and it instantly turns into a Tablet PC. Either way, it offers you built-in wireless access to information anywhere with the latest Intel® Centrino® Mobile Technology. So stop trying to decide on whether to get a new notebook or Tablet PC. Instead, get the functionality of both, for the price of only one. Go to us.fujitsu.com/computers or call **1.800.FUJITSU** today for details.



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MOBILE
TECHNOLOGY

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Chief Manager, Wm. R. Golden & Co., LLC
(www.wrgandco.com), an accounting firm
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EDITORS' CHOICES

AUGUST 17-SEPTEMBER 6, 2004



In the market to buy? Here are our latest Editors' Choices in the leading technology categories—the products we've picked as the best from the hundreds that PC Magazine Labs has been testing. For links to the complete reviews, including dates of publication, visit www.pcmag.com/editorschoice.

DESKTOP PCs & SERVERS

GAMING DESKTOPS

- Falcon Northwest FragBox Pro
- Falcon Northwest Mach V
- Velocity Micro Vision FX

MULTIMEDIA DESKTOPS

- Apple Power Mac G5 Dual 2 GHz
- Dell Dimension 8400

MEDIA CENTER PC

- HP Media Center PC m1050y

VALUE PC

- eMachines T2865

STUDENT PC

- eMachines T3092

SMALL-BUSINESS PC

- IBM ThinkCentre A50p

CORPORATE PC

- IBM ThinkCentre S50

ENTRY-LEVEL SERVER

- IBM eServer xSeries 306

WORKGROUP SERVER

- Dell PowerEdge 1750

STUDENT NOTEBOOKS

- Apple iBook
- Velocity Micro NoteMagix B50 Campus Edition

MULTIMEDIA NOTEBOOK

- Toshiba Satellite P25-S670

GAMING NOTEBOOK

- Dell Inspiron XPS

VALUE NOTEBOOKS

- Averatec AV3225HS



eMachines T3092

- HP Compaq Presario R3000Z

TABLET PCs

- Motion Computing M1400
- Toshiba Portégé M205-S809

MOBILE DEVICES

PDAs

- HP iPAQ Pocket PC h4350
- palmOne Zire 72

PDA/PHONE COMBOS

- Handspring Treo 600

PHONE

- NEW** Nokia 7610

GPS DEVICE

- TomTom Bluetooth GPS Receiver

HOME ENTERTAINMENT

MEDIA HUBS

- Creative Sound Blaster Wireless (music)
- Prismiq MediaPlayer (multimedia)
- Turtle Beach AudioTron AT-100 (music)

DIGITAL VIDEO RECORDER

- SnapStream Beyond TV 3

HDTV

- NEW** NEC PlasmaSync 61XM2+/S
- Sharp Aquos 37-inch LCD TV

CAMERAS

COMPACT CAMERAS

- Kodak EasyShare LS743
- Sony Cyber-shot DSC-T1

MIDRANGE CAMERAS

- Casio Exilim Pro EX-P600
- Olympus C-5060 Wide Zoom

SUPERZOOM CAMERA

- Olympus Camedia C-765 Ultra Zoom

PROSUMER CAMERAS

- Konica Minolta DiMage A2
- Leica Digilux 2
- Olympus C-8080 Wide Zoom

DIGITAL SLR CAMERA

- Nikon D70

ENTRY-LEVEL DV CAMERA

- Sony DCR-HC40 MiniDV Handycam

DIGITAL IMAGING

FLATBED SCANNER

- Microtek ScanMaker 6100 Pro

IMAGE EDITORS

- Adobe Photoshop CS (pro)
- Adobe Photoshop Elements 2.0 (consumer)

PHOTO ALBUM SOFTWARE

- Adobe Photoshop Album 2.0

PHOTO SHARING

- OurPictures
- Smugmug

PHOTO-PRINTING SERVICE

- Shutterfly

DIGITAL AUDIO & VIDEO

VIDEO EDITORS

- NEW** Adobe Video Collection 2.5
- Ulead VideoStudio 8 (consumer)

CD/DVD-BURNING SUITE

- Roxio Easy Media Creator 7

DVD AUTHORIZING

- Sonic MyDVD 5.2 (consumer)
- Ulead DVD WorkShop 2 (pro)

SLIDE SHOW CREATORS

- NEW** Arcsoft DVD SlideShow

PORTABLE AUDIO

- Altec Lansing inMotion (iPod speakers)
- Apple iPod Mini
- Belkin Digital Camera Link
- Delphi XM Roady2
- iRiver H140
- iRiver iFP-390T

SOUND CARD

- Creative Sound Blaster Audigy 2 ZS

SPEAKERS

- Creative Gigaworks S750
- Klipsch ProMedia GMX D-5.1

PC JUKEBOX

- Musicmatch Jukebox 8.2

MUSIC STORE

- Napster 2.0

WEBCAM

- Logitech QuickCam Pro

PRINTERS

PERSONAL PRINTERS

- Brother HL-5140 (laser)
- HP Deskjet 5150 (ink jet)
- Lexmark C510n (color laser)

PERSONAL AIOs

- Brother MFC-3420 (ink jet)
- Brother MFC-8420 (laser)
- Canon MultiPass MP390 (ink jet)

PHOTO PRINTERS

- Canon i9900 Photo Printer
- Epson Stylus Pro 4000
- HP Photosmart 7960

NETWORK PRINTERS

- NEW** HP Color LaserJet 4650n
- HP LaserJet 9000dn
- Xerox Phaser 4500DT
- Xerox Phaser 7750DN

HP Color LaserJet 4650n



Nokia 7610

EDITORS' CHOICES

AUGUST 17-SEPTEMBER 6, 2004



Envision EN7220

DISPLAYS & STORAGE

BUSINESS DISPLAYS

- NEW** Envision EN7220
- IBM ThinkVision C220p
- NEC MultiSync LCD1960NXi

BUSINESS PROJECTOR

- Sony VPL-CX85

GAMING GRAPHICS CARD

- ATI Radeon 9800 XT

MAINSTREAM GRAPHICS CARD

- PNY Verto GeForce 5700 FX Ultra

DVD BURNERS

- NEW** BenQ DW830A 8X DL
- HP DVD Movie Writer dc4000
- Memorex True 8X External Dual Format Recorder
- Pioneer DVR-A07XL

EXTERNAL DRIVE

- Western Digital Media Center

REMOVABLE STORAGE

- Iomega Rev 35

PORTABLE PHOTO STORAGE

- Micro Solutions RoadStor

PRODUCTIVITY SOFTWARE

OFFICE SUITE

- Microsoft Office 2003

OCR

- ScanSoft OmniPage Pro 14 Office

PDF CREATION

- Adobe Acrobat 6.0
- FinePrint pdfFactory PRO 1.57
- Jaws PDF Creator 3.0

DOCUMENT MANAGEMENT

- ScanSoft PaperPort Pro 9 Office

DESKTOP PUBLISHING

- Adobe InDesign CS

FINANCE & ACCOUNTING

- Microsoft Money 2004 Premium
- QuickBooks Premier 2004
- Quicken 2004 Premier

WEB SITE CREATION

- NeoVerve StoreSense

WEB RESEARCH

- Onfolio Professional

MEDIA CREATION SUITE

- Roxio Easy Media Creator 7

E-MAIL CLIENT

- Microsoft Outlook 2003

VIDEOCONFERENCING

- SightSpeed Video Messenger
- VidiTel

DATABASE

- FileMaker Pro 7

BLOG/WIKI TOOLS

- EditMe
- Socialtext Workplace 1.0
- TypePad

UTILITIES

ANTIVIRUS

- Norton AntiVirus 2004

FIREWALLS

- Norton Personal Firewall 2004

- ZoneAlarm Pro 5

SECURITY SUITES

- Norton Internet Security 2004
- ZoneAlarm Security Suite 5

ANTISPYWARE

- NEW** SpySweeper 3.0



Pioneer DVR-A07XL

ANTISPAM

- Cloudmark SpamNet 2.5
- MailFrontier Desktop 4.0
- Qurb

POP-UP BLOCKER

- PopUp Cop

INSTANT MESSAGING

- MSN Messenger 6.1

FILTERING/MONITORING

- Cybersitter 9.0
- Spector Pro 5.0
- The Children's Internet

FILE COMPRESSION

- PKZip 8.0 for Windows
- Stuffit Deluxe 8.0

BACKUP

- IBackup
- Retrospect Pro 6.5

ROLLBACK

- Norton GoBack 3.0

DISK IMAGING

- Acronis True Image 7.0

PARTITIONING

- PartitionMagic 8.01

DEFRAGGERS

- Diskeeper 8.0 Pro

- PerfectDisk 6.0

REMOTE ACCESS

- LapLink Everywhere 2.0

FILE MANAGER

- Novatix ExplorerPlus 6.1

MIGRATION

- Alohobob PC Relocator

- Ultra Control

- Desktop DNA Pro 4.7

TOOLBARS

- Dogpile

- Google Toolbar

DESKTOP CUSTOMIZATION

- Object Desktop 2004

DOWNLOAD MANAGER

- DownloadStudio 1.0

SCREEN CAPTURE

- SnagIt 7.0.3

FILE VIEWER

- IrfanView 3.85

VIRTUAL PC

- VMware Workstation 4.5

PASSWORD MANAGER

- AccountLogon 2.5

ENTERPRISE SOFTWARE & DEVELOPMENT

NETWORK ANTIVIRUS

- Trend Micro Enterprise Protection Strategy

ENTERPRISE ANTISPAM

- BrightMail Anti-Spam 5.1
- Postini Perimeter Manager

E-MAIL SERVER PLATFORM

- IBM Lotus Notes and Domino 6.5

WIRELESS PLATFORM

- GoodLink 3.0

WEB FILTERING

- Websense Enterprise 5.1

CRM

- salesforce.com Enterprise Edition

DATABASE

- Oracle 9i Database

WEB CONFERENCING

- WebEx Meeting Center

ENTERPRISE DEVELOPMENT

- Borland JBuilder 9

- IBM WebSphere Studio

- Device Developer 5.6

- (mobile)

- SQL Anywhere Studio 9

- (mobile)

WEB SITE DEVELOPMENT

- Macromedia Contribute
- Macromedia Studio MX 2004

WEB SITE ANALYSIS

- WebSideStory HBX

VULNERABILITY SCANNER

- Retina Network Security Scanner

NETWORKING

SERVER OS

- Microsoft Windows Server 2003 Enterprise Edition

WIRELESS INFRASTRUCTURE

- Hawking HWPS12UG

- (print server)

- Linksys Wireless-G

- WRT54GS (802.11g)

- Netgear ProSafe-FWAG114

- (802.11a/g)

SECURITY APPLIANCE

- ServGate EdgeForce

REMOTE-ACCESS APPLIANCE

- Neoteris Access 1000

GAMES & EDUCATIONAL SOFTWARE

SIMULATION

- Microsoft Flight Simulator 2004

ACTION/COMBAT

- Battlefield Vietnam

- Far Cry

- Halo: Combat Evolved

- Orbz 2

- Savage: The Battle for Newerth

SPORTS

- Madden NFL 2004

REAL-TIME STRATEGY

- Rise of Nations: Thrones and Patriots

VIRTUAL WORLD

- Second Life

ONLINE

- EverQuest: Evolution

EDUCATION

- eMedia Beginner Guitar Method 3.0

- Math Mission: The Race to Spectacle City Arcade, The Amazing Arcade Adventure

- Vtech V.Smile Learning System, Smartbridge Library

- Zoombinis Island Odyssey

MOBILE GAME

- Bejeweled

REFERENCE

- Microsoft Encarta

- Rerence Library 2005

- Visual Thesaurus

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34 Sony VAIO VGC-RA810G
34 ABS Awesome 4300
35 Panda Platinum Internet Security Suite 8.03
36 Nokia 7610



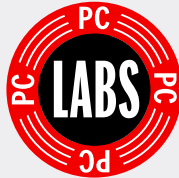
36 Archos AV420 Pocket Video Recorder
38 Mozilla Firefox 0.9.1
38 Opera 7.52
42 Sony VAIO VGN-A190
42 Dell Inspiron 700m



VoIP: Finally Worth a Look

THE MAGAZINE
WORLD'S LARGEST
COMPUTER-TESTING
FACILITY

BY CRAIG ELLISON



Hundreds of thousands of consumers collectively save millions of dollars each month by replacing (or supplementing) their traditional telephone service with personal Voice over IP (VoIP) telephony. We tested three of the leading services to see if they've exorcised the demons that plagued pioneering VoIP solutions. • Using IP to transmit voice is not new. Large corporations and long-distance carriers have used IP to transmit voice on their private networks for years.

Likewise, private citizens have been using their computers and the Internet to talk with other PC users for a few years now. But in the past, users of such solutions have had to contend with poor voice quality and the need for at least one computer to be connected to the Internet.

Widespread adoption of broadband Internet service (cable or DSL) in the last few years has in turn fueled a surge in the growth of much-improved personal VoIP. To get started, you need an analog telephone adapter (ATA) to convert your voice into data packets. (Your VoIP service provider will either supply you with the ATA for a nominal amount, or the ATA may be included in the service offering.) In most cases, all you have to do is connect the ATA to your broadband modem and a conventional phone and you're ready to start making calls to any phone in the world.

Most VoIP service providers offer all-inclusive calling plans that provide you with unlimited

local, regional, and long distance (within the United States) at flat rates starting as low as \$24.95 per month. Some offer usage-based plans at a lower monthly cost, and most provide inexpensive per-minute rates on international calls as well. In addition, VoIP service providers include a smorgasbord of advanced features such as name and number caller ID, call forwarding, call blocking, and voice mail that traditional phone companies sell as premium services.

When you sign up for VoIP service, many service providers give you the option of choosing the area code, and possibly the exchange, for your service. You can select from any area where the VoIP provider has local service.

(Live in Texas and want a New York or San Francisco area code? No problem.) Likewise, some providers will sell you a "virtual number" for a nominal additional monthly charge. When called, this virtual number automatically goes to your

actual number and if, for instance, that virtual number is in a relative's area code, your relatives can call you for free.

So what are the drawbacks of a personal VoIP solution? The main drawback is the need for a reliable broadband connection; without one, a VoIP solution is probably not for you. Power outages present another hurdle. Since VoIP requires a live Internet connection, losing electricity means losing your phone service. If you are concerned about losing power, you could install a UPS for your cable/DSL modem and your ATA. Even a small UPS would keep those devices powered for several hours. Alternatively, you could keep a single phone line with no premium services as a lifeline for those times that you might lose your power or Internet connection.

Emergency 911 calls are an

SUMMARY OF FEATURES

Voice over IP

■ YES □ NO	AT&T	VoicePulse	Vonage
Adapter cost (direct)	Free	Basic plan, free; unlimited, \$79.99	Free
Number of phone lines supported	1	2	2
Monthly fee (basic plan)	N/A	\$14.99 (200 min.)	\$14.99 (500 min.)
Monthly fee (unlimited plan)	\$34.99	\$24.99	\$29.99
Free in-network calls	Unlimited plan only	■	■
Number of area codes	127	139	179
Number of rate exchanges	2,194	1,458	1,936
Virtual number support (cost per month)	□	■ (\$4.99)	■ (\$4.99)
Inbound 800 number	□	□	■
Teleconferencing (number of parties)	■ (10)	■ (6)	□
Number portability	■	■	■
Do-not-disturb feature	■	■	□
Can block international calls	□	■	■
Call hunting	■	■	■
Forward on network outage	■	■	■

N/A—Not applicable: The company does not offer this type of plan.

PRODUCT PHOTOGRAPHY BY THOM O'CONNOR

LOOKS

WHAT THE RATINGS MEAN: ●●●●● EXCELLENT | ●●●●○ VERY GOOD | ●●●○○ GOOD | ●●○○○ FAIR | ●○○○○ POOR

- 44 Spy Sweeper 3.0
- 44 The GIMP 2.0
- 46 Adobe Video Collection 2.5 Professional
- 48 ATI HDTV Wonder

- 48 NEC PlasmaSync 61XM2+/S
- 50 HP Color LaserJet 4650n
- 50 HP Scanjet 5590
- 50 HP Officejet 4215 All-in-One
- 50 HP Color LaserJet 2550L

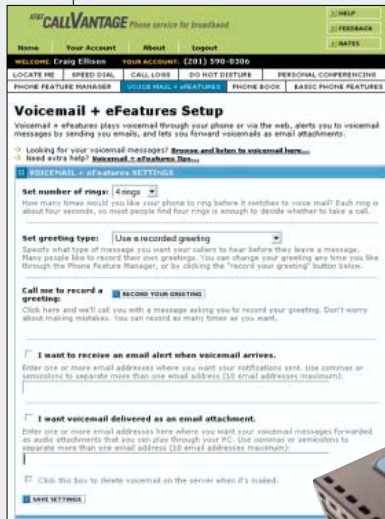


- 50 Samsung CLP-550
 - 52 SmartRisk Analyzer 1.0
 - 52 Research Manager
- RED type denotes Editors' Choice.

other challenge for VoIP telephony, because it's difficult to determine the exact location of an IP address with geographic certainty. Without knowing the exact location, it's also difficult to determine which call center should receive a VoIP-originated 911 call (though most VoIP providers do have 911 call routing based on the address you used when you registered).

The voice quality of your VoIP call is also another consideration. Since the data travels across the Internet, there's the potential for dropouts or "burbles" similar to what you might experience on a cell phone. Managed IP networks, used by all the VoIP providers in the roundup—coupled with quality of service (QoS) mechanisms built into their ATAs and a high-quality compression algorithm (G.711)—yield call quality that generally exceeds that of cell phones and approaches or matches that of traditional phones. Most people we called during our tests were surprised at the quality of the calls and didn't realize they were on a VoIP connection until we told them. (Keep in mind that this won't be the case with providers who *don't* manage their IP networks.)

So while they aren't yet perfect, the leading VoIP services are certainly worth a look for broadband users who want to squeeze more value out of their connections.



AT&T CALLVANTAGE is a newcomer to the VoIP party, but it delivered the best voice quality here.

AT&T CallVantage

For many people, the name AT&T remains synonymous with telephone service. Yet the company's rollout of CallVantage in late March of this year makes it a relative newcomer to the personal VoIP telephony market. Still, after only three months of service, AT&T already has more rate exchanges and 70 percent of the area codes offered by industry veteran Vonage (launched in April 2002).

AT&T gives you a free adapter when you sign up for the CallVantage service, a D-Link DVG1120M VoIP gateway. We placed our order online on a Friday afternoon, and the adapter was delivered the following Wednesday. Unfortunately, the CallVantage system was the most difficult to set up among the three we

tested for this story. Although AT&T provided excellent illustrated instructions, the ATA (actually a router) had to be connected directly to either a cable or DSL modem. It also had to be configured to receive a public IP address and could not be installed behind an existing router.

This configuration means that the device controls your



Internet connection, the upside being that it guarantees bandwidth to ensure a high-quality voice connection no matter what other activities are happening on your network. Unfortunately, if you have an existing network, you'll have to reconfigure it. (AT&T has promised a firmware upgrade in coming months that will allow the gateway to be installed behind an existing router.)

Once the gateway is configured, you must log into the Web site to activate your system. AT&T currently offers only a single, all-inclusive plan at \$34.99 per month (not including promotional offers). The service includes free voice mail with either e-mail notification or e-mail attachment of voice messages. Voice mail can also be retrieved and played through a Web browser. A *Locate me* feature can be configured to ring up to five phone numbers, either in sequence or simultaneously. You can also

set the system to *Do not disturb*, though callers have the option of pressing "2" to have urgent calls ring through.

Free call conferencing for up to ten parties is a unique offering among the services reviewed. Other competitors either don't provide conferencing or charge extra for it. That said, CallVantage currently lacks some features offered by competitors, such as support for multiple lines, virtual numbers, and 800 service (though AT&T will add these features in the coming months).

While all the VoIP providers in our roundup provided acceptable call quality, in a jury test AT&T was unanimously voted as having the best voice quality. That helps offset the difficult installation and higher price, making CallVantage an attractive option.—CE

AT&T CallVantage

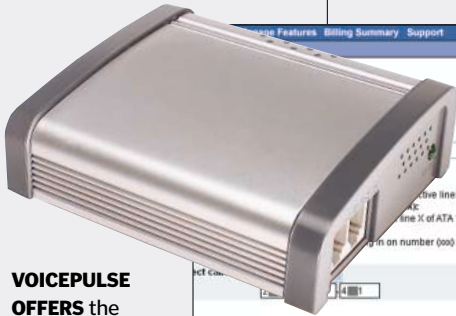
\$34.99 per month. AT&T, www.usa.att.com/callvantage.



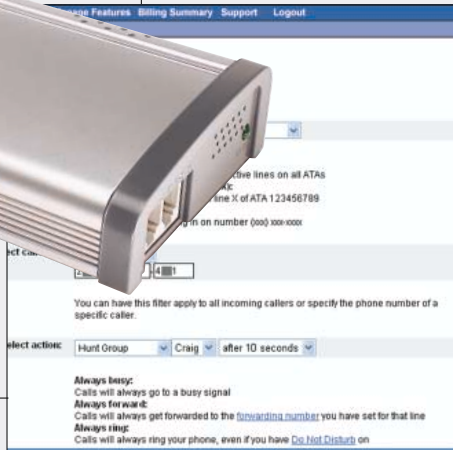
VoicePulse

VoicePulse is one of the more established players in the VoIP space. VoicePulse does try to differentiate itself from other players in the field, specifically with the amount of features offered in its plans.

Setting up VoicePulse is easy and straightforward, with just one catch: You need your own router (or need to buy one) if you want both to surf the Web and to have phone service on your broadband connection. You simply plug the Sipura SPA-2000 ATA from VoicePulse into your network router (depending on the service level



VOICEPULSE OFFERS the widest array of advanced call features.



you choose, the Sipura is either included or will cost \$79.99), plug your phone into one of the analog phone ports on the ATA, wait a minute, and then pick up the receiver. You should have dial tone.

The system's sound quality is quite good. Service offerings start with the Local Unlimited +200 plan for \$14.99 per month. This plan allows unlimited local, regional, and user-to-user calls as well as 200 minutes of long-distance calls. It also includes the Sipura ATA.

VoicePulse's basic and advanced features, which come with all plans, consist of caller ID, call waiting, call transfer, repeat dial, return call, and three-way calling—an impressive array of extras that incur hefty surcharges when added with traditional phone providers.

Even more impressive are the available advanced features—namely, the extensive filtering capability. Using its extremely granular controls, you can decide which line to apply a filter to and select whether a filter should apply to all callers or just a particular caller (based on caller ID information). You then chose the desired action for those callers (such as call forwarding to a particular number, sending the caller directly to voice mail, or giving callers a busy signal). You can also have the system play a not-in-service message for callers you really want to get rid of permanently. A more

humorous than practical action choice is the rejection hotline, which tries to convey to the caller that the call is unwanted by playing a funny but annoying message.

Voice mail options, too, are extensive. You can, for instance, check voice mail via the Web or have each message attached to an e-mail and sent to an e-mail account. In addition, VoicePulse has Connect! Service, a peer-to-peer offering of its services tailored to IT personnel or integrators who want to build and host their own PBX solutions based on the Asterisk open-source PBX gateway. This service supports both SIP and IAX2.

We were extremely impressed with the breadth of features found

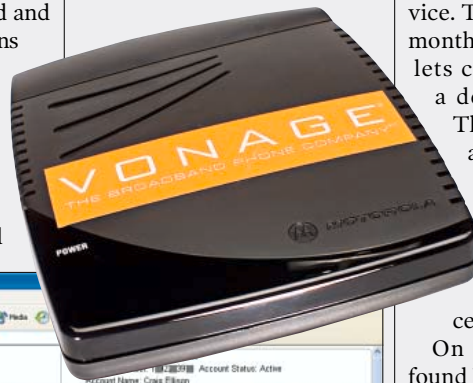
in VoicePulse and its easy-to-navigate Web interface. It's certainly in the hunt among VoIP services.—*Oliver Kaven*

VoicePulse
Basic plan, \$14.99 per month; unlimited, \$24.99 per month. VoicePulse Inc., www.voicepulse.com. ●●●●○

Vonage
Vonage is one of the pioneers in broadband VoIP, and the company's maturity shows in several respects. For one, Vonage offers telephone-based installation support and customer care. Customers will also find that the Vonage Web site has a more polished look and gives better help when you do run into technical difficulties.

Vonage's features are similar in scope to those of other VoIP carriers. Pricing starts at \$14.99 per month for a basic plan that allows 500 minutes of talk time anywhere in the U.S. and Canada. The \$29.95 Premium Unlimited plan offers unlimited local and long-distance calling within the United States and Canada.

Getting ready



VONAGE'S WEB SITE is more polished than the others, giving quick access to calling features, activity reports, and billing information.

to make your first phone call is uncomplicated and involves no more than connecting the Motorola VT1005V ATA to your network and phone. The VT1005V can be configured in a bridged mode behind an existing router or serve as your network router (it has two Ethernet ports: one for the router, the other for your PC). Vonage does not charge for the unit but has a \$29.99 activation fee before you can start using any of the services.

The service's features are comparable to those found in VoicePulse, including voice mail, caller ID (with name), call waiting, call forwarding, three-way calling, and free in-network calling. When you compare the extended feature sets, those from Vonage are a bit less advanced than the ones that VoicePulse delivers, especially when it comes to call filtering and call forwarding.

But Vonage has two additional services that the other providers don't offer: Vonage Toll Free Plus and a fax service. Toll Free Plus (\$4.99 per month for up to 100 minutes) lets callers contact you via a dedicated 800 number.

The fax service is a Vonage fax line (\$9.99 per month). After paying a one-time \$9.99 activation fee, you can use 250 minutes of outgoing fax service and receive unlimited faxes.

On our quality tests, we found Vonage to have a slightly higher amount of background noise than the solutions from AT&T or VoicePulse. A faint hum was noticeable, especially when users paused in a sentence. Otherwise, the voice quality was good. In general, we were satisfied with Vonage's service, as well its speedy order processing and competitive pricing.—*OK*

Vonage
\$14.99 to \$29.99 per month. Vonage, www.vonage.com. ●●●●○



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Sony's Monolith Is a Media Center PC

BY JOEL SANTO DOMINGO

It's a tall, bold design, and we approve. The **Sony VAIO VGC-RA810G Media Center PC** is a silent beauty, thanks to what lurks inside: a large set of radiator fins, which are connected to liquid-filled heat pipes that transfer the heat from the processor. All of this results in a quiet PC perfect for the living room or den.

Like most other Media Center PCs to date, the VGC-RA810G still looks like a tower PC. But doors hide the DVD drives and other ports, making the overall box quite easy on the eyes. The VGC-RA810G runs the current version of Microsoft Windows Media Center 2004, an OS we like a lot. The picture from the included TV tuner is rock-steady, and the 3.4-GHz Pentium 4 (Prescott), 1GB of RAM, and 7,200-rpm SATA hard drive are definitely capa-

ble of handling the overhead added by the OS.

Video is rich and detail is clear on the 19-inch SDM-HX93 monitor (which accounts for \$899.99 of our as-tested price). The LCD has



A BOLD DESIGN and innovative cooling system make this Sony PC at home in the den.

a switch on the side that lets the user change between different video modes, depending on whether you are using the PC or watching

video programming.

The bundled speakers sound fine, and there is a plethora of ports on the back panel (including digital optical-out) for hooking the system up to your home theater system. In a

design that brings to mind Sony's consumer electronics roots, the remote control looks much more like a Sony TV remote than the Media Center reference design used by most of the other manufacturers.

The VGC-RA810G's perfor-

mance scores were right in line with those of other recent P4 machines. There is room for an additional two SATA hard drives, so you can increase hard drive space as needed, but you still have to open the case. In this regard, the VGC-RA810G trails our current favorite Media Center PC, the HP Media Center PV m1050y, which has a slot on the front for removable hard drive cartridges.

The Sony VAIO VGC-RA810G is a solid Media Center PC. It's worth a look if style and silent operation are important to you.

Sony VAIO VGC-RA810G Media Center PC

With Intel Pentium 4 550 (3.4-GHz), 1GB DDR 400 SDRAM, 250GB hard drive, ATI Radeon X600XT graphics, 19-inch LCD, dual-layer DVD±RW drive, DVD-ROM drive, integrated Intel audio, Sony 2.1 speakers, Microsoft Windows XP Media Center Edition 2004, \$3,099.98 direct. Sony Electronics Inc., www.sony.com. OVERALL ●●●●○ Music: 98 (out of 100); Photo: 100; Video: 93; Gaming: 85.

A Multimedia PC That Can Double as a DVR

BY ROY GOODWIN

The **ABS Awesome 4300** is ready for multimedia duty. Need proof? Look no further than the included Winfast TV tuner card (with DVR software) and wireless remote.

You can use the 120GB hard drive to store episodes of your favorite TV shows. Should you want to archive them, a DVD±RW drive is included. Although the I-Trigue speakers are only a stereo pair with a subwoofer, they have a nice output suitable for cramped spaces and a remote pod for controlling volume, bass, and treble. You don't get an LCD monitor at this price, but you won't

mind watching DVDs on the large, crystal-clear Samsung SyncMaster 955DF 19-inch CRT.

ABS bundles a Microsoft cordless multimedia keyboard and mouse, complementing the



WITH ITS TV TUNER, the ABS Awesome 4300 is an attractive multimedia PC.

freedom you get with the TV tuner remote. With two USB 2.0 ports behind a decorative silver front panel and three at the rear, adding other peripherals is a cinch. You won't need to add a memory card reader, as one is built in. There's also a rear-mounted FireWire port.

ABS didn't skimp on software, either. Pinnacle's Instant CD/DVD Suite and Ulead's Cool 3D, Movie Factory, and Video Studio help your multimedia production work along. WordPerfect Productivity Pack and World Book 2004 aid office productivity.

The 4300 performed admirably on our tests, besting or equaling similar systems in its class. It achieved scores of

22.3 on Business Winstone 2004, 29.5 on Multimedia Content Creation Winstone 2004, and 2,168 on 3DMark03. Performance certainly wasn't hurt by having a 7,200-rpm SATA hard drive aboard.

It's hard to go wrong with this system at this price. Sure, we would have liked to see Microsoft Windows Media Center Edition as the OS, but if this won't be a living-room PC, you won't miss that.

ABS Awesome 4300

With AMD Athlon 64 3000+, 512MB DDR 400 SDRAM; 120GB 7,200-rpm SATA hard drive; 128MB nVidia GeForce FX 5700 graphics; Samsung 19-inch CRT; DVD±RW drive; DVD-ROM drive; Creative Labs I-Trigue 2.1 3300 speakers; integrated Realtek AL658 6-channel audio; Microsoft Windows XP Home, \$1,295 direct. ABS Computer Technologies Inc., www.abspc.com. OVERALL ●●●●○ Music: 48 (out of 100); Photo: 90; Video: 80; Gaming: 74.

Good Antivirus, Filtering in Panda Suite

BY JAY MUNRO

Panda Software, attempting to play with the big boys (McAfee and Symantec) in the U.S., has updated its security suite. The new offering, **Panda Platinum Internet Security Suite 8.03**, delivers very good virus protection, content filtering, and firewall protection but comes up short on blocking spam and spyware.

Installing Panda is a breeze, but you do have to register the product (which means providing some personal information) to get your user name and password and subsequent automatic updates. Panda's clean interface makes it easy to keep on top of updates and monitor your computer's status.

Panda's default mode is "self-testing," periodically checking for alerts, updates, and local problems, and displaying a dialog box in the lower right of the screen when needed. The pop-ups can be turned off or configured to show only specific information. Panda's antivirus capabilities are robust, with a daily update schedule for virus-pattern files. Scanning is fast, and e-mail protection unobtrusive. By default, Panda scans only specific files, but you can choose to have it scan all files. In our testing, Panda promptly stopped incoming viruses in EXE or HTA (HTML application) files, but it didn't stop Web archive (ZL9 and ZL7 files), because archive scanning is off by default in on-access mode. But when we attempted to open these infected files, Panda sprang into action.

Automated scans are easy to configure with the Scan Job Wizard, and as with Symantec's Norton AntiVirus, you can create and save custom scans. On-demand scanning—both

manual and scheduled—is more stringent by default than on-access scanning, as it scans archives and all files.

Panda is built for more than just home use; it offers some enterprise-style features for small and even medium-size



YOU CAN configure all aspects of Panda Platinum Internet Security from a single dialog box.

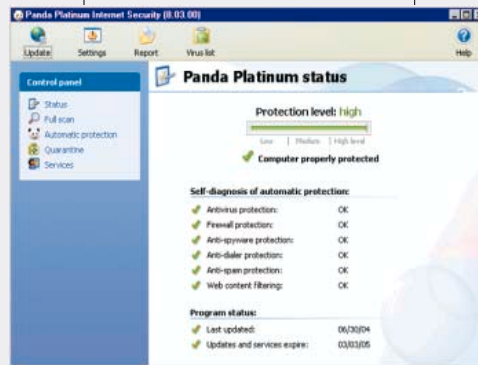
businesses, such as scanning Microsoft or Novell network drives. IT managers can configure machines to send e-mail alerts when an infection occurs. It can also broadcast alert messages to other Panda users on Windows NT/2000/XP Pro systems on the same network or domain (when used in conjunction with the company's enterprise server and an agent installed with the product). One feature that is thankfully turned off by default: You can send an alert to the sender or recipient of an infected e-mail.

Like Norton Personal Firewall, from Symantec, and ZoneAlarm, Panda's firewall automatically configures Internet applications as you use them. It comes preset for only the applications that are installed by default with Windows, such as Internet Explorer, Outlook Express,

and Windows Media Player, as well as various TCP/IP utilities (ping, route, and so on). If you don't like the defaults, you can change them.

When you run any other applications, the firewall asks your permission to let it connect to the Web, giving you the option to deny it or allow it once or always. Advanced users can manually configure applications or tinker with specific IP address and port settings. Intrusion alerts are on by default but can be turned off. The firewall doesn't have as many bells and whistles as ZoneAlarm, but it is easy to set up and effective.

For parents and employers, Panda offers optional content filtering. This is a little more complicated to use than a standalone product like Cybersitter or Net Nanny, but it is extensively configurable. Panda defines four basic filters (kid, teen, default, and employee), and you can create your own custom filters



PANDA'S STATUS screen shows the most recent update, subscription length, and level of protection at a glance.

that use some or all of more than 50 categories, from sports and shopping to sex, drugs, and rock 'n' roll.

Panda's antispam protection appears to be a work in progress, flagging less than a third of what we considered

spam in our mailbox. At least it didn't flag any of our good mail as spam.

The new spyware protection basically worked, but you'll still need other tools—namely Webroot's Spy Sweeper 3.0, our current Editors' Choice (see page 44)—to be covered fully. To see how well it blocks incoming spyware, we clicked on some of the links in the racier spam messages in our mailbox. We were instantly overwhelmed by pop-ups, our browser home page was hijacked, and a search bar was installed. Then we downloaded some spyware that destabilized our whole system. Panda flagged nothing during all this.

After we rebooted, however, the spyware tried to connect to the Internet, and Panda detected it. We also found that Panda detected spyware downloads as they were putting temporary installation programs on our hard drive. A full scan removed the executables and the installation program—a step in the right direction—though our home page was still hijacked and a search bar still installed. We really like Panda's ability to detect hoaxes and dangerous attachments (files with double extensions, and so on).

Panda Platinum Internet Security does a good job of keeping your machine clean, virus-free, and safe from attack. The spam and spyware protection are not the best, but the firewall, content filtering, and virus

protection are just fine. It is a good choice for both home and business users.

Panda Platinum Internet Security Suite 8.03

\$79.95 direct (12-month subscription).
Panda Software,
www.pandasoftware.com. ●●●●○

Nokia's IMP Camera Phone Is Tops

BY SASCHA SEGAN

PC Come for the looks. Stay for the camera. That could be the come-on line for the **Nokia 7610**. The 7610 is part of the first wave of one-megapixel cameraphones to hit our shores, and if you're serious about using the camera in your phone, you should settle for nothing less. The difference between VGA images (such as those on most models nowadays) and the 7610's 1,152-by-876 pictures is huge: Images are much more detailed and brighter on the 7610 than on the Nokia 6620 and others.

The camera is a great leap forward for phones, but remember to moderate your expectations: The 7610 still does not measure up to a dedicated digital camera. Compared with a IMP Sony U10, the 7610's shots taken under simulated daylight conditions suffered

from a mild case of the jaggies (when diagonal lines turn into stair-step shapes).

The phone itself stands out, even before you take your first picture. Nokia is known for off-the-wall designs, and the 7610's swoosh-shaped keypad looks weird but works intuitively—as long as you're right-handed. It's missing a dedicated volume button, though; you have to start a call and use the navigation pad to change the volume. The phone is slender and feels light, with a clear screen that's even somewhat visible in daylight. On our tests, the 7610 delivered 6 hours 15 minutes of talk time on a single charge.

The 7610 comes with two neat, unique applications: a mobile version of the Muvee automatic movie-editing software, which can piece together short video clips into music video-style movies; and Lifeblog, a very cool app that lets

you look at your e-mail, text messages, and videos, all listed together in chronological order on your phone or PC screen.

Since the 7610 is a Symbian Series 60 phone, you can buy various third-party applications, including high-quality e-mail, Web browsing, and Microsoft Office document-reading programs. You can sync

NOKIA'S 7610 boasts a IMP camera and a host of software.

contacts, calendar data, and e-mail over a USB or Bluetooth connection (as long as you have the right Bluetooth stack). The phone accepts RS-MMC (re-

duced size MultiMedia Card) flash memory.

The 7610's speakerphone sounds loud and clear, though when you hold the phone up to your ear, the built-in speaker can sound soft in noisy areas. Although the phone has Bluetooth, it refused to pair with our Logitech Bluetooth headset (Nokia reps say the company supports most but apparently not all Bluetooth headsets). But the 7610 did hook up as a modem to our Bluetooth-equipped PC.

All told, the Nokia 7610 currently sets the pace for high-end handsets.



Nokia 7610
Price not yet set. Nokia, www.nokia.com.
●●●●○

Bring Your Music, Videos, even TV

BY BILL HOWARD

Here's the deal: If you're willing to put up with 4 ounces more weight than an iPod, you can carry around an all-encompassing portable media player and recorder with a built-in color display. That's the fascinating new **Archos AV420 Pocket Video Recorder**. It's a music player, of course, but also stores and shows photos, and it plays and records video—including TV shows. The AV420 is not one of the upcoming Portable Media Centers based on Microsoft Windows Mobile, but it's here now and it's pretty good.

The 9-ounce AV420 comprises a 1.1- by 5.0- by 3.1-inch (HWD) system unit with a 3.5-inch active matrix

display, and a 20GB drive. While each dimension is just a fraction of an inch bigger than a music-only player such as the iPod, the volume is two to three times as much, so you won't be carrying this one on your hip. There's a Compact Flash slot, a handy internal microphone for voice



BRING YOUR VIDEOS with you (along with photos and music) on the AV420.

recording, and a mono speaker.

For music and photos, you can copy over folders or playlists of MP3, WMA, JPG, or BMP files using the USB 2 connection or the CF card. On vacation, you can use the CF slot to off-load digital camera pictures (SD and Memory Stick cards work via an adapter). You can also record music (as WAV) using line-in. To use the DVR feature for recording TV, you set the date, time, and channel information using the player buttons or the remote.

Videos already on your PC must first be converted to MPEG4 format; a conversion utility is included. Unprotected video such as TV shows can be recorded on the fly at several quality levels. Battery life in constant use was

4 hours 15 minutes playing video, 12 hours playing music. The screen beats those of traditional music players hands down: You see track and title information, the next song due in the playlist, and the album cover art—all in color.

There are some rough edges. You have to sort through three cables comprising a rat's nest of seven jacks to make connections to external recording and playback devices. Setup requires separately installing several applets rather than one all-encompassing install routine, and there are two separate manuals with a dearth of details.

If you want a media player and want it now, the AV420 won't disappoint. But cautious souls might want to see the Portable Media Centers first.

Archos AV420 Pocket Video Recorder
\$500 street. Archos, www.archos.com.
●●●●○



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Time to Find an IE Alternative?

BY MATTHEW D. SARREL

Microsoft's Internet Explorer is the de facto Web browser on Windows PCs. As such, it is a prominent target for attackers relying on its documented vulnerabilities. In addition, its slow rendering engine and dearth of privacy features may plant the thought in some iconoclastic

browser is built on Mozilla's Gecko engine and relies on extensions (think plug-ins) to provide additional functions.

The company's Extensions Manager facilitates downloading of additional functions, such as more precise pop-up blocking, text zooming, or faster text searching.

Installing Firefox is simple,

der nonstandard DHTML properly. That said, all of the pages that we regularly access loaded rapidly and accurately. So if you want a browser that respects your PC intelligence and helps you get things done, Firefox is a good place to start.

Mozilla Firefox 0.9.1

Free download. The Mozilla Organization, www.mozilla.org. ●●●●○



FIREFOX'S TABBED INTERFACE and ability to perform keyword Web searches in a background tab ensures that the right information is always at your fingertips.

minds that IE may not be the best browser for everyone.

So here we evaluate the newest offerings of two IE alternatives: Firefox 0.9.1, from the Mozilla Foundation, and Opera 7.52, from Opera Software. The two share some notable similarities. First and foremost, in our hands-on testing, we noticed that pages load much faster in Firefox and Opera than in IE. Another helpful feature is that both of these browsers can save a group of open pages as a session, which you can then open at start-up. We also like that a Google search bar is present by default in each.

While none of this will be enough to lure casual PC users away from IE, power users who suspect there is a better way should certainly take a look.

Mozilla Firefox 0.9.1

If you want to browse the Web quickly without any bells and whistles, Mozilla Firefox 0.9.1 is worth the free download. (Version 0.9.1 is a public preview release; the 1.0 launch is planned for this summer.) This modular

with a wizard that guides you through transferring bookmarks, settings, cookies, history, and saved passwords from your current browser. At first launch, a new streamlined interface makes it clear that this is a no-nonsense browser. Simplified buttons, navigation, and search bars complement a large, open browsing area. If you don't like this look, fire up the Theme Manager from the *Tools* menu and customize away.

A number of features make finding information easier with Firefox than in IE. Smart Keywords is a very cool feature that lets you easily get additional information—such as definitions, stock quotes, weather—right from the location bar. For example, typing “dict baseball” in the location bar will get you the Dictionary.com entry for baseball. You can launch a Web search by right-clicking on highlighted text within the main window and keep reading the original page while the search loads in a background tab.

The browser isn't perfect, however. Firefox does not ren-

Opera 7.52

A survivor in the browser wars, Opera is more feature-rich than IE and lets you organize information more easily. Opera makes use of a series of panels on the left of the screen to provide easy access to information, which you can then organize logically. The Notes panel, for example, lets you collect selected text from a Web page, your annotations, and a link to the page. The Links panel provides a summary of all the links on the Web page you are currently browsing.

A time-saving feature in Opera called Fast Forward analyzes the current page and determines the page you would most likely go to next. Another time-saver is Hotclick, whereby double-clicking on a word on a page pops up a context-sensitive menu with options, such as searching the Web for that word, looking it up in a dictionary or encyclopedia, or translating it into another language.

Opera's privacy controls are more accessible than IE's, most notably the option to delete pri-

ate data (history and cache) on leaving the browser. Cookies can be managed via general or server-specific policies. The Wand password manager does an adequate job of tracking user names and passwords. The Opera browser also comes with an e-mail client, Opera Mail, which includes full text-indexing of messages, antispam filters, and an RSS reader.

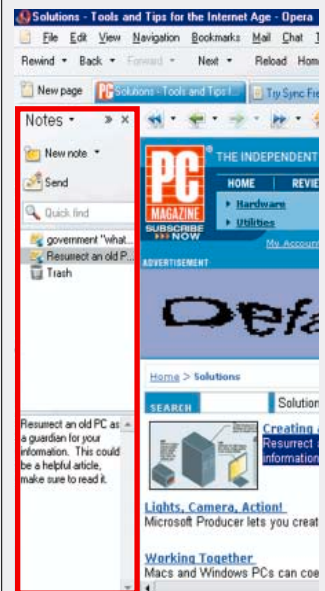
In our testing, we found that Opera has more trouble rendering certain types of pages than either IE or Firefox did. For example, Opera stumbled running JavaScript events based on mouse-overs and clicks. But the vast majority of pages you run across will work just fine.

You can load the ad-supported version of Opera for free to see if you like it. With its wealth of features, we think heavy Web surfers won't mind ponying up \$39 for the ad-free version.

Opera 7.52

Free (ad-supported); ad-free, \$39 direct. Opera Software ASA, www.opera.com.

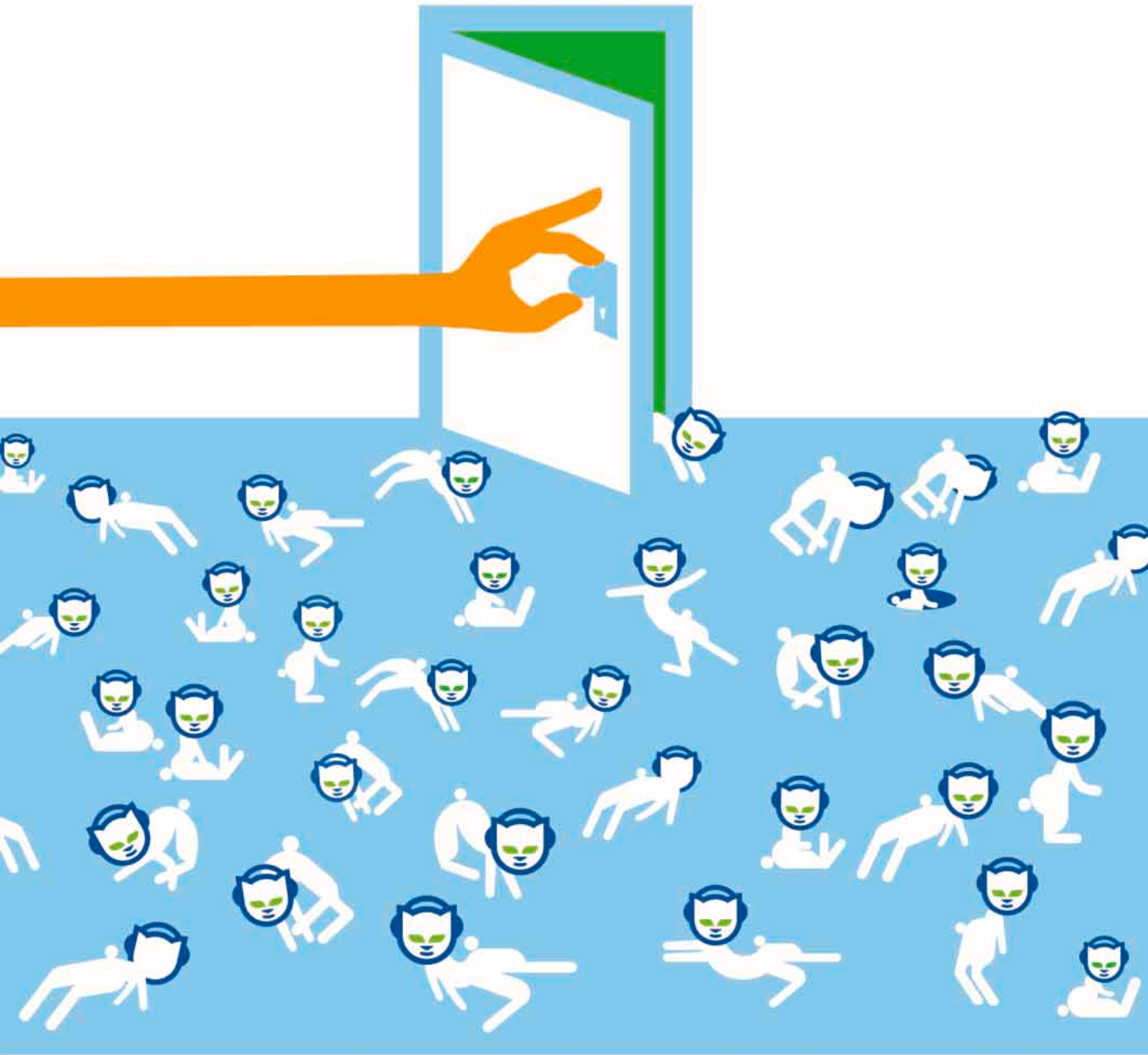
●●●●○



THE NOTES PANEL IN OPERA

provides an easy way to organize and annotate Web pages gathered for research.

DOING IT A LOT IS OKAY



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Media-centric Sony Portable Is So Close

BY CISCO CHENG

Sony is known for its sleek industrial design, and the Sony VAIO VGN-A190 is a star example. Thinner and lighter than other multimedia portables, the VGN-A190 has a gorgeous 17-inch WUXGA (1,920-by-1,200) widescreen. It is also one of the quietest multimedia portables out there. If only Sony would update its GigaPocket software (or load Microsoft Windows Media Center Edition), this VAIO would be tough to beat as an entertainment notebook.

Capable of reaching HDTV resolutions, Sony's XBrite display (1,920-by-1,200) is a marvel to look at. Right below the screen, you'll find an ambient light sensor that automatically adjusts the screen brightness to accommodate various lighting conditions. The bundle includes a fully loaded docking station, which is where the TV

tuner resides. On the system itself is an AV-out port that can output to an NTSC display as well as a Memory-Stick slot. The DVD±RW is a must-have on this caliber of entertainment system. The built-in speakers are decent, but the ones on the HP zd7000 are better. That said, the Sony comes with a set of cool external speakers.

One of the selling points of the VAIO line used to be Sony's own GigaPocket DVR software, but given the current state of the competition (namely, the Media Center Edition OS and SnapStream's Beyond TV 3), we weren't impressed. We found the Sony software hard to manage and unresponsive at times.



BUILT FOR ENTERTAINING, the Sony VAIO VGN-A190 features a gorgeous screen.

The VGN-A190 beat out both the HP zd7000 and the Toshiba P25-S670 on our business application tests and held its own on Multimedia Content Creation Winstone (20.6). The system was also the only one of the three to run our gaming tests at both 1,024-by-768 and 1,600-by-

1,200 resolutions.

Sony got it right with respect to where portable entertainment systems are heading. The incredibly high-resolution screen and quiet operation are two important factors in multimedia systems. And Sony's sleek and thin design is preferable to that of the larger systems. If uses other than TV are your primary concern, you can't beat this entry. But if DVR features are your reason for buying a multimedia portable, consider a Media Center notebook instead.

Sony VAIO VGN-A190

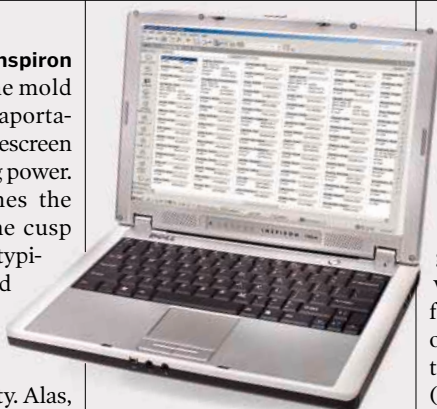
With Pentium M 735 (1.7 GHz), 512MB DDR SDRAM, 80GB 4,200-rpm hard drive, ATI Mobility Radeon 9700 graphics, 17-inch WUXGA screen; DVD±RW drive, Centrino G 2200 wireless, Microsoft Windows XP Home, \$2,799 direct. Sony Corp. of America, www.sony.com. OVERALL ●●●●○ Music: 84 (out of 100); Photo: 77; Video: 83; Gaming: 84.

Dell Goes Wide, and Hits the Mark

BY CISCO CHENG

The new Dell Inspiron 700m breaks the mold of previous ultraportables, incorporating a widescreen and plenty of processing power. The new design pushes the 700m to 4 pounds—the cusp between ultraportable (typically 3 to 4 pounds) and mainstream thin and light (4 to 5 pounds)—but the bigger screen is worth the weight penalty. Alas, the trade-off in battery life that the screen necessitates may give some road warriors pause.

The 700m is a completely new design. Dell has replaced the Inspiron line's gray-and-blue chassis colors with a more lustrous silver coating. But the biggest change is the screen: a 12.1-inch widescreen LCD (1,280-by-800). Brighter and



GET A WIDE VIEW in a little machine with the Dell Inspiron 700m.

higher in contrast, the new screen makes working outdoors or watching DVD movies noticeably better. Also new: an optical drive (an 8X DVD+RW unit in our tested configuration) that is now built in.

A slew of other features includes an SD slot and a number of ports: two USB, one FireWire, one VGA, and one S-Video.

The 17.5-mm keyboard pitch (92 percent of full size) is manageable, but the mouse buttons generate a bit more noise than what we'd like. And you won't find any quick-launch buttons or addressable buttons to control DVD playback. Battery life (2 hours 17 minutes) was disappointing; this means that frequent travelers will need to tote the extended battery (\$129), which should roughly double the runtime.

The Pentium M 745 (1.8 GHz) delivered strong performance on the Business Winstone (17.0) and Multimedia Content Creation (23.6) test suites. The 700m's 802.11g wireless scores

just as well, with 20.1-Mbps throughput at close range and 4.2 Mbps at 160 feet. The Intel 82855 GME integrated graphics is fine for 2D tasks but was not robust enough to run our 3D gaming tests.

Dell is going out on a limb among major manufacturers by opting for a widescreen display in this class, and we like it. The 3.2-pound IBM ThinkPad X40 is still our favorite ultraportable, thanks to its great keyboard and excellent battery life. But if you want a widescreen display (and don't mind a little more weight and a little less runtime per charge), give this system a try.

Dell Inspiron 700m

With Pentium M 745 (1.8 GHz), 512MB DDR SDRAM, 60GB 4,200-rpm hard drive, Intel 82855 GME graphics, 12.1-inch WXGA display (1,280-by-800), DVD+RW drive, 802.11g wireless, Microsoft Windows XP Home Edition, \$2,099 direct. Dell Inc., www.dell.com. ●●●●○

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Spy Sweeper Eradicates More Malware

BY JOHN CLYMAN



Even as adware and spyware evolve into more aggressive forms, antispysware utilities are becoming more effective at combating these pernicious pests. Webroot's **Spy Sweeper 3.0** improves on the capabilities of Spy Sweeper 2.2, our previous Editors' Choice, with solid spyware-removal capabilities, an improved interface, and the most effective real-time blocking we've seen.

Spy Sweeper's extensive real-time blocking notified us immediately when it detected browser and home-page hijacking efforts, alterations to our HOSTS file (which can redirect requests intended for one domain to another), and additions to the list of programs that Windows runs at start-up. It also detected spyware processes attempting to run and offered the opportunity to block the



SPY SWEEPER'S INTUITIVE INTERFACE helps you first identify rogue programs and then eliminate them from your system.

suspect program once or permanently. While most of the real-time spyware-blocking systems we've tested have been only marginally effective—often detecting spyware only after installation was complete and the program was already well-enconced—Spy Sweeper often managed to detect suspect behavior early enough to

prevent spyware from installing successfully at all.

Spy Sweeper's full-system scan was both rapid and effective in identifying infestations. We like Spy Sweeper's expandable tree view of detected spyware and summary of each threat but wish it included a way to ignore tracking cookies so we could focus on the

threats posed by actual spyware and adware interlopers.

Unfortunately, Spy Sweeper's quarantine process bogged down badly when the program had to remove more than a dozen or so spyware programs. On a couple of heavily infected test-bed systems, the removal stage thus took hours to complete. As with other anti-spyware tools, we found clearing out persistent spyware often required multiple reboot and rescan cycles; even then, although Spy Sweeper's success rate was high, it wasn't perfect.

But that kind of torture test is a worst-case scenario. All told, Spy Sweeper provides an easy-to-use and largely effective way to combat spyware, particularly with its strong abilities to prevent malware's installation in the first place.

Spy Sweeper 3.0

\$29.95 direct. Webroot Software Inc., www.webroot.com. ●●●●○

New UI Makes GIMP Worth a Look

BY GALEN FOTT

GIMP—its name stands for GNU Image Manipulation Program—was first released by two Berkeley students in 1996. Since then, this free open-source program has matured into a powerful image editor. The latest release, **The GIMP 2.0**, has a completely revamped interface that makes it a more legitimate player in the world of mainstream image editors.

GIMP is best known to Linux and Unix users, so we tested the new release on SUSE Linux 9.1 Personal. The last generation of GIMP supplied many of the features you get in an application like Adobe Photoshop: It offered layers, channels, paths, and a spate of painting tools. Unfortunately, the interface was awkward and



THE GIMP 2.0 FEATURES A REVAMPED INTERFACE that brings it more in line with mainstream image-editing applications.

sometimes confusing. The new UI takes giant strides forward, making GIMP simpler and more flexible. For example, the old interface made you right-click on the image window in order to choose almost any function in the program. Now

a menu at the top of the image window (as you get into the more mainstream programs) offers easy access to GIMP's wide array of commands.

We especially like what GIMP has done in the way of palettes. First off, the new

tabbed palettes are nestable and dockable, making GIMP more streamlined while also making more efficient use of screen real estate. A Histogram palette displays a constantly updated graph of the brightness levels in the current image, and the new Fonts palette lets you choose a typeface for use with the new editable text tool.

We also tested the Windows version and were impressed to see that GIMP installs painlessly on Windows XP and runs just as well as it does on Linux. In terms of feature breadth and ease of use, GIMP just can't compete with products like Adobe Photoshop Elements 2 and Jasc's Paint Shop Pro 8 (both of which are available for less than \$100). Still, GIMP 2.0 is a powerful program, and its price certainly can't be beat.

The GIMP 2.0

Free. The GIMP Team, www.gimp.org. ●●●●○



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Adobe's Video Suite Adds Up to More

BY JAN OZER AND
DON LABRIOLA



The whole really is greater than the sum of the parts, especially if that whole is Adobe

Video Collection 2.5 Professional. The package contains an impressive assortment of tools for the professional videographer: Adobe Premiere Pro 1.5, Adobe After Effects 6.5 Professional, Adobe Audition 1.5, Adobe Encore DVD 1.5, and Adobe Photoshop CS (reviewed as part of Adobe Creative Suite in our January 2004 issue).

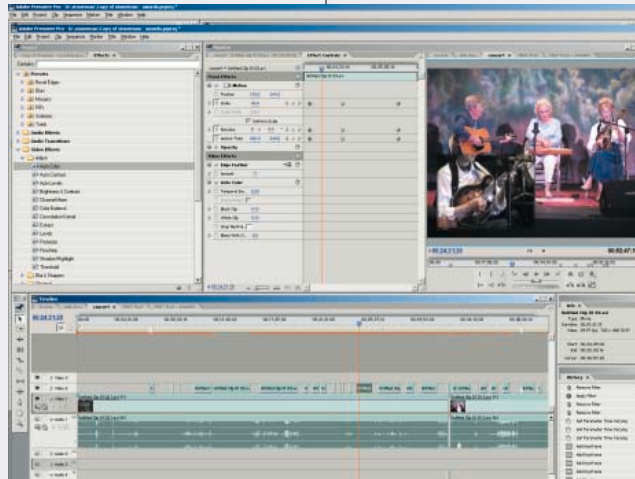
Some of these applications—namely Photoshop and Audition—are best of breed, while others are solid though not spectacular. But when you put them all together in a single package, you've got a bundle that offers an unmatched level of functionality at an unbeatable price (\$1,499 direct; \$999 for the Standard edition without Photoshop).

The core of the suite is Premiere, a more than competent video-editing solution. We like its updated, clutter-resistant interface. Adobe has added four automatic color-correction filters (borrowed from Adobe Photoshop), providing a welcome alternative to Premiere's own complicated color-correction filter. Also new are Bezier controls over motion paths, which smooth pan and zoom effects over video and still images.

Premiere's MPEG-2 encoding speed is very competitive. It produced our 12-minute test project in 28 minutes 4 seconds on a 3.2-GHz Pentium 4 workstation, compared with 41:04 for Pinnacle Liquid Edition 5.5. But note that the bundle does not support background rendering, so other packages are much faster when writing back to DV tape.

On its own, Premiere is not the most feature-rich editor

out there. For example, its chroma key and slow-motion capabilities are substandard when compared with those found in Sony Vegas and Liquid Edition. But the other parts of the suite lift Premiere's attractiveness.



PREMIERE'S WIDE-OPEN INTERFACE is one of the easiest to use in the prosumer class.

Adobe has upgraded Encore, the DVD-authoring component of the bundle, adding playlist capabilities that match those of Ulead's DVD Workshop. Encore now contains improved pre-burn error checking and added workspace options that minimize (but don't entirely cure) the clutter endemic to the first edition.

Photoshop aficionados will love Encore's new customizable style libraries that you can populate with content and effects for menus, buttons, and text components. You can now preview menus via the FireWire port, speeding menu design. Designing from scratch within Encore, however, is frustrating due to a lack of shortcuts that simplify certain tasks. For example, there are no wizards for creating basic projects, nor is there a Paste Attribute function for standardizing the size and appearance of buttons and text components. Further-

more, Encore lacks a dedicated slide show function.

After Effects (the suite's motion- and visual-effects editor) adds new text animation presets and many additional filters, including particle smoke and sparks. And as with Encore and

trographic window, enabling you to perform seemingly impossible tasks like removing audience noise or applying a volume fade to a single instrument. Pitch correction capabilities let you fix out-of-tune instruments and vocals. And a part extraction tool lets you either isolate or remove content at any pan position in a stereo mix. Audition also boasts a greatly improved automatic click/pop eliminator, ReWire compliance, 5,000 free audio loops, and the ability to set the tempo and duration of music or narration to match the length of a video clip.

Best of all, Adobe has made strides with integration among the products, making this a tighter bundle rather than a collection of separate applications. For example, you can now copy and paste clips from Premiere to After Effects, and access most After Effects filters from Premiere. You can create image files in Premiere for editing in Photoshop that automatically use the correct resolution and aspect ratio, and you can move audio files easily to Audition and back.

Individually, each of these products is a solid competitor in its field. Taken as a bundle, however, Adobe Video Collection 2.5 Professional simply can't be beat.

Adobe Video Collection 2.5 Professional	\$1,499 direct. Adobe Systems Inc., www.adobe.com. ●●●●○
Adobe Premiere Pro 1.5	\$699 direct. ●●●●○
Adobe After Effects 6.5 Professional	\$999 direct. ●●●●○
Adobe Audition 1.5	\$299 direct. ●●●●○
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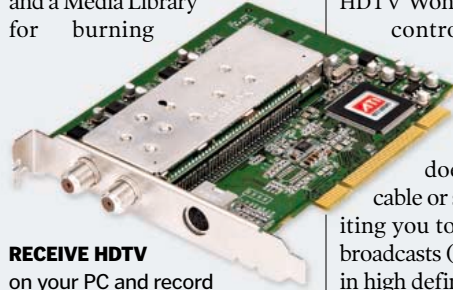
See and Save HDTV on Your PC, Affordably

BY DAVE SALVATOR

For a TV junkie, HDTV is the ultimate fix. Though PCI HDTV cards have been on the market for a while, the **ATI HDTV Wonder** raises the bar and drops the price. Most other cards check in at close to \$300; the HDTV Wonder lists for almost \$100 less. And ATI does a better job of integrating digital TV software than others we've seen.

The card includes a Philips HDTV tuner, but ATI's NXT2004 receiver chip does most of the heavy lifting. This chip is set up only as a 70-channel over-the-air HDTV receiver, and it doesn't support CableCard, which would accommodate HDTV cable sources. Two coaxial inputs handle over-the-air HDTV and either a standard-definition TV antenna or an analog cable

feed. The card can also pass along 5.1 Dolby Digital audio to your sound card. The bundle includes ATI's Multimedia Center 9.0 software, with applications for standard TV, HDTV, and a Media Library for burning



RECEIVE HDTV on your PC and record it with the ATI HDTV Wonder.

DVDs and transcoding content.

To test the HDTV Wonder, we watched the NBA finals at 720-pixel resolution on a Gateway 30-inch HD-Ready LCD TV display. The image quality

was very good indeed—dramatically better than SDTV. Skin and hair detail were sharp, and we could even read the players' tattoos.

A PC equipped with the HDTV Wonder gives you more control over recorded content than an HDTV set-top box (which costs about \$500). But it doesn't receive HDTV cable or satellite service, limiting you to local, over-the-air broadcasts (so forget about HBO in high definition).

ATI's DVR (software is a welcome addition, though not perfect. Time-shifting with the Pause button worked well, but recording on the fly was less intuitive, and the audio/video sync was off at times.

The Media Library software

can create DVDs either directly from broadcasts or by transcoding HDTV content from ATI's proprietary format to MPEG-2, MPEG-4, VideoCD, and Super VideoCD. We did encounter some issues. For example, DVDs created by the ATI software stuttered in some consumer DVD players; ATI knows about the problem and plans to fix it. Also, when we encoded video to DVD, the software annoyingly converted the aspect ratio to 4:3 from 16:9 without asking.

Still, the HDTV Wonder's image quality is solid, and it offers a good array of DVR features. For \$199, you get a whole lot of high-definition support in one box.

ATI HDTV Wonder

\$199 list. ATI Technologies Inc., www.ati.com. ●●●●●

NEC's Bigger, Better Plasma Display

BY LOYD CASE

Prices for plasma displays haven't come down much, but size and picture quality have definitely gone up. The **NEC PlasmaSync 61XM2+/S** demonstrates both of these trends: It's one of the largest displays available, and it produces a striking image.

The PlasmaSync delivers full 720p HDTV resolution and scales to 1080i, as long as you supply the tuner. It's pricey, but for the discriminating home-theater enthusiast, this plasma display is worth a look.

Installing the panel is a chore best left to professionals. At 135 pounds it's not light, and its size makes moving awkward for even two people. A professional AV installer can also help guide you through the menu settings. The on-screen menus are easy to navigate, but the remote control is not backlit and



FOR 18 LARGE you get a gorgeous 61-inch plasma monitor just begging for a true home theater to be built around it.

has small buttons.

At our display test facility, we measured a so-so contrast ratio of 178:1, although the screen's black level was excellent. Gray-scale tracking was

good, but RGB-level testing revealed a slight bias toward green. Colors tended to be a little on the cool side, but some tweaking brought the amount of red up to pleasing levels.

In eyes-on testing, high-definition video looked outstanding. We viewed a variety of demos from Microsoft in its WMV-HD format. Image quality was simply stunning, and color fidelity was exemplary. PC games displayed on the panel had an almost immersive feel. The PlasmaSync's superb built-in scaler and the panel's full 1,365-by-768 resolution made watching DVD movies an outstanding experience. We tested 480i and 480p (progressive scan) output, with excellent results for both formats.

Of course, a monitor this big and thin with such excellent image quality doesn't come cheap. For what it costs, you could buy a car or send your kid to college for a year. But if you've already done those things and still have money to burn on HDTV glory, then the NEC PlasmaSync 61XM2+/S just may be the ticket.

NEC PlasmaSync 61XM2+/S

\$17,995 list. NEC Solutions (America) Inc., www.necvisualsystems.com. ●●●●●

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C O M P U T E R S

Color Laser Ratchets Up a Notch

BY M. DAVID STONE

PC MAGAZINE EDITORS' CHOICE

The HP Color LaserJet 4650n is a nearly perfect workgroup color laser. Equipped with a faster processor than that in Hewlett-Packard's 4600 series, the 4650n gains a boost in engine speed (22 pages per minute for color or monochrome). Environmental sensors adjust printing for temperature and humidity, making color output more consistent. And with the optional hard drive installed, the 4650n gains the ability to hold a print job for proofing and private printing, along with other useful features.

The 4650n is the fastest color laser we've tested other than the much more expensive Xerox Phaser 7750/DN (our other Editors' Choice among network color lasers). Total time for the



A FAST ENGINE and fine output make the 4650n a winner.

business applications suite (we tested using QualityLogic's hardware and software, www.qualitylogic.com) was 9 minutes 27 seconds, which outdoes some monochrome printers with faster engines. Four high-quality color PowerPoint slides

printed in just 22 seconds.

Output quality is impressive. Text was excellent, with more than half our test fonts easily readable at 4 points. Graphics were just short of excellent. Photo quality falls between good and very good, a high rating for a laser and better than some ink jets.

One potential issue is a claimed 1.6-cent cost per monochrome page, which is more than the amount claimed for most monochrome lasers. That could make the 4650n an expensive choice as your sole office printer. But if you're looking for a color printer to supplement rather than replace a monochrome laser, the HP 4650n clearly belongs on your short list.

HP Color LaserJet 4650n

\$2,099 direct. Hewlett-Packard Development Co., www.hp.com.
 OVERALL ●●●●○ Text ●●●●●
 Graphics ●●●●○ Photo ●●●●○



HP Officejet 4215 All-in-One

Pros: Output quality is very good across the board.
Cons: Slow performance.

Bottom line: Built around an ink jet printer and sheet-feed scanner, the HP Officejet 4215 all-in-one is aimed at those who want basic fax, copy, and scan features but don't need to scan photos or pages from bulky sources.

\$150 street. Hewlett-Packard Development Co., www.hp.com.
 OVERALL ●●●●○ Text ●●●●○
 Graphics ●●●●○ Photo ●●●●○

HP Color LaserJet 2550L

Pros: Better output than most color lasers of any price. Paper options for up to 875 sheets.
Cons: Slow.

Bottom line: With the HP Color LaserJet 2550L, HP has delivered an inexpensive color laser that produces better output quality than many printers that cost much more. Unfortunately, it runs slower than some ink jets and has a high cost per monochrome page.

\$499.99 direct. Hewlett-Packard Development Co., www.hp.com.
 OVERALL ●●●●○ Text ●●●●●
 Graphics ●●●●○ Photo ●●●●○



HP Helps You Scan Everything

BY M. DAVID STONE

When you see a scanner with a 50-sheet, duplexing ADF built into its top cover—like the **HP Scanjet 5590**—you know it's designed to scan multipage documents for OCR and to fax, copy, and manage business documents. But the 5590 goes such scanners one better: It scans photos at a reasonably high quality and even does a credible job on slides.

The 5590's resolution (2,400 optical by 2,400 mechanical pixels per inch) is the minimum required for reasonable slide scans and is far more than enough for business applications. One measure of the actual resolution is that even at the default 300 ppi for OCR, the automated OCR module man-

aged to read Times New Roman and Arial text as small as 8 points without a mistake on our tests. That earns the scanner a rating of very good in this category. The 5590 comes with ReadIris Pro 8.0 for those who want to use a standalone OCR program rather than the automated module.



THIS OFFICE SCANNER also does a fine job with photos.

Photo scan quality was just short of excellent, and there is an option for enhancing colors in faded photos. Slide scans offer unusually good dynamic range for a flatbed scanner, maintaining detail in both bright and dark areas.

Just as important as the 5590's scan quality is its ease of use, with such conveniences as scan buttons on the front panel, well-designed software, and simple installation with a high-speed USB 2.0 connection. If you need a moderate-duty office scanner—and particularly one that can handle photos well—the 5590 is worth a look.

HP Scanjet 5590

\$399.99 direct. Hewlett-Packard Development Co., www.hp.com.
 OVERALL ●●●●○ Photo ●●●●○
 Slides ●●●●○ OCR ●●●●○

Samsung CLP-550

Pros: Excellent paper handling for the price, including built-in duplexer.

Cons: Text quality is low for a laser printer. Somewhat sluggish performance.
Bottom line: The Samsung CLP-550 offers an attractive set of features for the price, with a 250-sheet paper tray and a built-in duplexer. But text quality is low for a laser, and performance is less than stellar.

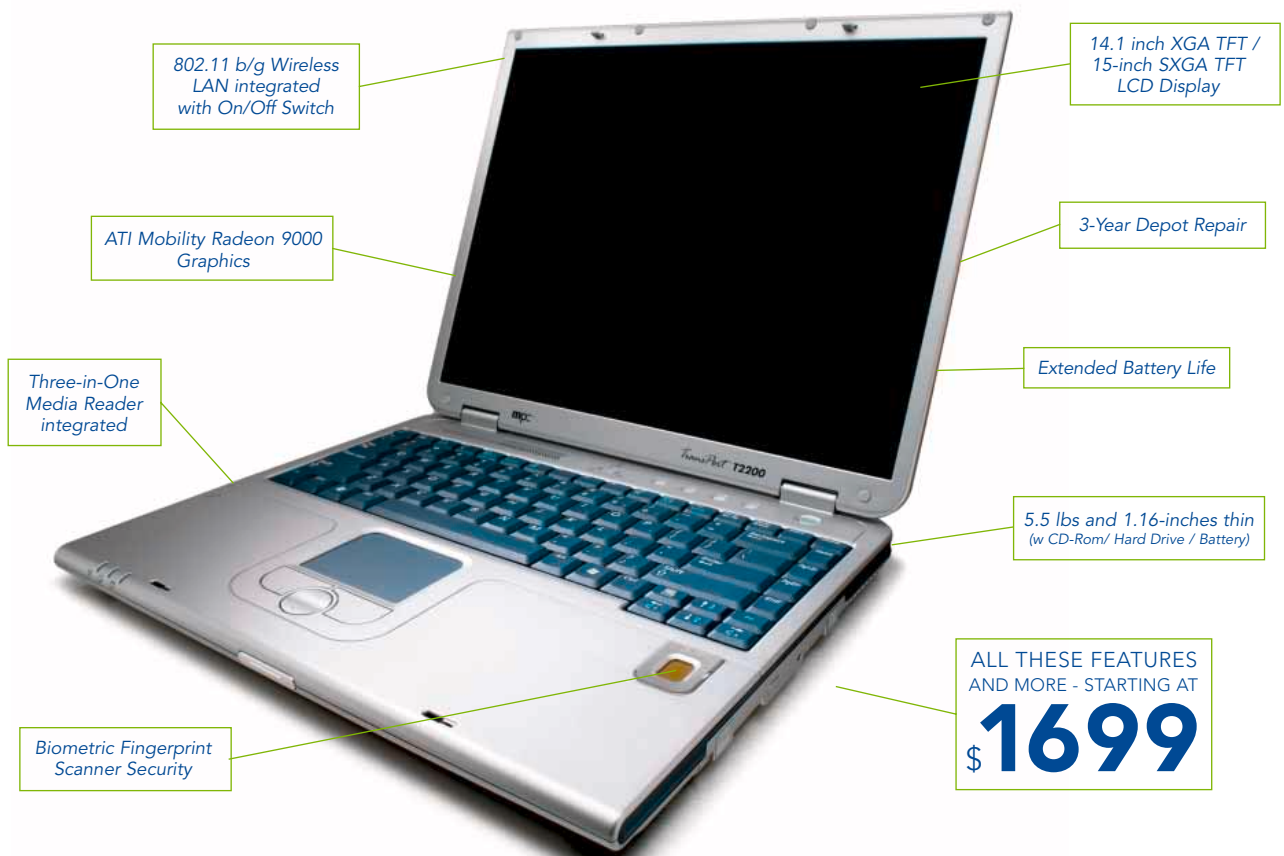
\$600 street. Samsung Electronics America Inc., www.samsungusa.com.
 OVERALL ●●●●○ Text ●●●●○
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Safer Code Cuts Security Risks

BY RICHARD V. DRAGAN

To write secure software, developers have to think like hackers and find flaws before the bad guys can exploit them. **SmartRisk Analyzer 1.0** from @stake provides considerable security expertise for any company writing or maintaining code in C/C++. This powerful, expensive code analysis tool has some noteworthy technology and can spot potential risks in your code base before trouble starts.

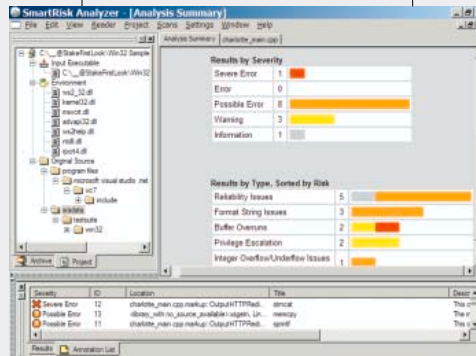
SmartRisk Analyzer runs on Windows and Solaris, targeting just C/C++ code for now. The lack of support for ASP and scripting languages is a limitation, but the next release will support Java and C#.NET. At this price, a standard setup installer would also be nice; as it stands, you have to unzip the files yourself to get started.

SmartRisk Analyzer offers a simple yet effective shell for

defining projects that contain multiple-source code and compiled (binary) files. It scans them for security flaws and does a good job at spotting dependencies, like Win32 DLLs. It can do more if you have the source code along with the compiled version. But if you don't, you can still scan older executables through its Deep Binary Analysis capability. This feature is

@stake's proprietary approach to scanning source code along with the binary (or executable) version in order to identify vulnerabilities introduced by interactions with other components.

@stake says SmartRisk Analyzer performs over 400 checks for errors and security loopholes, such as buffer overwrites and improper error



THE SMARTRISK ANALYZER shell digs into your C/C++ code and executables. It displays the scan results in a handy graphical report.

Risk Analyzer spotted a handful of potential errors and made more than 100 suggestions for improved security. A graphical report summarizes warnings and errors in several categories for quick reference. You can also view annotated C/C++ source code, along with syntax highlighting, to see exactly where potential problems lurk within the file.

Though it's probably just too expensive for small to midsize organizations, the technology in SmartRisk Analyzer marks it as a useful tool for enterprises that need to make security a priority throughout a project's life cycle and can afford to pay for it.

SmartRisk Analyzer 1.0
\$30,000 and up, direct. @stake Inc., www.atstake.com. ●●●●○

handling. Enterprise-class development tools like IBM WebSphere Application Developer offer code coaches that give suggestions, but they have nothing that addresses security in as wide and deep a way as is offered here. For example, while analyzing an open-source Web server with over 80,000 lines of code, Smart-

How's Your Site Doing?

BY SAHIL GAMBHIR

What happens when someone visits your site for the first time? Do people find it helpful and easy to navigate? Or do they get stuck and give up after a few wrong turns?

Clickstream-tracking tools like WebSideStory's HBX (First Looks, August 3) offer a wealth of traffic pattern data, but the information doesn't always yield precise conclusions. Targeting that gap, Keynote's **Research Manager** service (part of its WebEffective Intelligence Platform) lets site planners generate usability metrics via in-line custom questionnaires. Research Manager analyzes the responses to reveal juicy market research information such as participant intent, drop-off patterns, and task per-

formance metrics.

The Web-based console's dashboard window offers site managers several options for new usability and market research projects. We borrowed the Basic Task Test template (one of 23 available projects) for our tests. A simple wizard guides you through setting up tasks for users of the site to complete and questions for them to answer. Editing the content and the URL to direct questions at our test site was a snap.

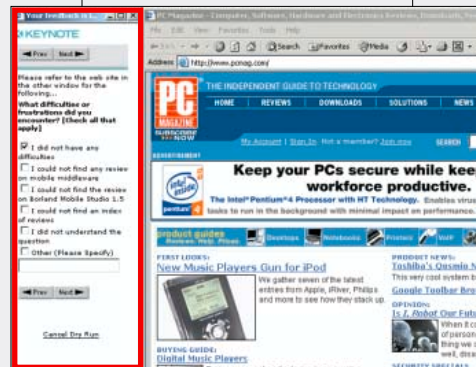
Question types range from a variety of multiple choice, rated, and ranked queries to freeform, long-answer ones. We inserted new questions and

deleted extraneous ones from the template with the smooth WYSIWYG editor. Research Manager even addresses small details, with an option to present a nondisclosure agree-

Survey results are aggregated into useful reports that show response tallies and breakdowns. A clickstream view presents a graphical map of the routes participants chose in completing a task. You can export data logs as Microsoft Word documents, and clickstream data can become a tab-delimited file. Advanced report filters and cross tabulation let you dig deeper into the data.

Research Manager is a worthy addition to your stable of QA tools. It isn't cheap, but it adds a crucial element to traditional Web analytics by letting you interact directly with site visitors.

Research Manager
\$75,000 per year. Keynote Systems Inc., www.keynote.com. ●●●●○



RESEARCH MANAGER displays a series of questions (left) that relate to the site you're asking about.

ment to each participant. Still, a noticeably absent feature in the designer is a way to customize survey question paths based on user responses.

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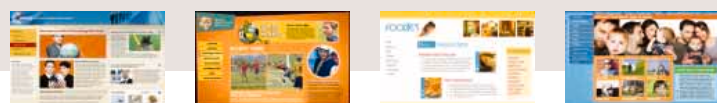
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FEEDBACK

“ Globalizing labor will alleviate poverty, creating more demand for products worldwide. ”

COMPUTER SECURITY AND PERSONAL RESPONSIBILITY

At the end of “Is Microsoft to Blame?” (August 3, page 72) the author states that “...primary responsibility must shift away from people like the Zboans and back to where it belongs: with Microsoft.” That’s an interesting comment, since the beginning of the article states that the Zboans didn’t download any of the patches from Windows Update or even the new definitions for their antivirus software—either of which would have kept them from getting the Sasser worm.

Where does personal responsibility begin, or is it even seen as a factor? The article even states that no software maker can anticipate every flaw, but in this case Microsoft did provide a solution a full month before the worm posed a problem. Windows Update has been up for years, since Windows 98, and regular updating has been around that long with antivirus software as well.

Microsoft could do a better job when it comes to security. But when a company that has its entire business on computer doesn’t take advantage of the easy-to-use tools provided to it, that is its own problem, and I find myself with no sympathy. When you own something that you use especially for your job, it is your responsibility to do the studying to keep up with it. If these people can’t do routine updates to the computer that their “...entire business is on...” to keep it protected, then perhaps they should not be in business.

STACY BLAKE

I really enjoyed “Is Microsoft to Blame?” I especially liked this phrase from the much cited Gary McCraw: “Linux is a collection of 5,000 independent things, and no one is ever quite sure who wrote them or what they do.” It helped me to understand all the humor of the article.

IGOR BELYI

GLOBALIZATION: GET USED TO IT

Globalization is a fact with a deep history and a longer future. IT professionals complaining about the movement of jobs around the world can get in line behind garment and automom-



bile workers to name a few. As long as capital is freer to move than labor, this trend will continue.

Workers in foreign lands, contrary to local bigotry, are not inferior and often work harder, to escape poverty and prevent its recurrence, than some complacent workers in more wealthy regions. It is far past time that we stop seeing offshore workers as competitors for our jobs, and see them rather as partners in the globalization of labor in a sea change that will truly lift all boats. Globalizing labor will alleviate poverty, creating more demand for products worldwide, while leveling the playing field so that global corporations will have less to gain by moving jobs.

JASON WESTON

Everyone who chooses sides in the outsourcing debate sees the issue as a black (or brown?)-and-white, all-or-nothing proposition, as if all development and IT work will be handed and handled offshore. This makes no sense. Comparing IT outsourcing to the abandonment of electronic manufacturing to Japan in the late 70s and early 80s is stupid. TVs and VCRs are “dumb” devices that were manufactured by only a handful of companies at high cost before we found a cheaper way that led to everyone here being able to afford them.

Today, all businesses and most households in the U.S. have computers that take skills to configure, operate, and repair—not to mention enhance. Do outsourcing-terrified workers think that this will all be handled by “sending out for Indian”? Just as there are still hundreds of thousands of TV repairmen in this country, there will be millions of IT workers to support our entire IT infrastructure.

I am a Senior Software Developer, and have roughly the same skill set as I did three years ago, albeit a bit more experience. Should I expect to continue at the same income level without learning anything new? Those who expect that are not being realistic. Innovation fuels this country, and we all have a part to play in that.

WADE ANDERSON

Corrections and Amplifications

- The Belkin PureAV Wireless Digital Audio receiver profiled in Coming Attractions (August 3, page 20) will not be available any time soon. Instead, the company plans to release an updated version next March that will be 802.11g-compatible and offer a better user interface.
- Due to an editing error in an After Hours review of Mountaincow Printing Press 2.1 (August 3), we neglected to mention that we were reviewing the Platinum edition of the software, which includes extra features that were also not mentioned. These include a monogram tool for personalized stationery, the ability to add borders and background images, and one-pass printing. The standard edition includes the features mentioned in our review and is available for \$39.95 (list).
- The photograph in the 17th Annual Reader Satisfaction Survey (August 17, page 76) should have been credited to Bruce T. Brown/Getty Images.

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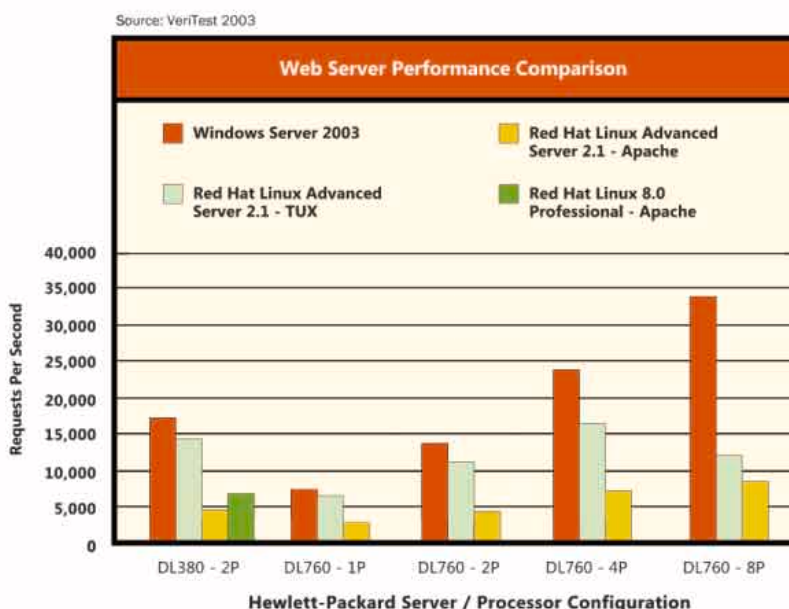
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WHICH OFFERS SUPERIOR PERFORMANCE: WINDOWS OR LINUX? THE RESULTS ARE IN.



The Windows platform generated up to 300 percent better peak Web serving performance compared to Linux according to a recent benchmark test conducted by VeriTest, a leading independent testing company. In fact, VeriTest found that Windows Server™ 2003 with Internet Information Server (IIS) 6.0 outperformed every Red Hat Linux configuration they tested, regardless of the server employed or the number of processors. To get the full study and more third-party findings, visit microsoft.com/getthefacts



Bill Machrone



Because I Deserve It

Wouldn't you love to have a roomful—or a houseful—of state-of-the-art computer and consumer-electronics technology? That's what we promised in *PC Magazine's* Digital Dream Home/Small Office/Dorm Makeover contest. All you had to do was convince us that you had a need and would make good use of the equipment. We ran the contest a few months back on our Web site (relax, it's closed now). We asked entrants how they would use the products, why they needed the makeover, and why we should pick their entry.

In the process of picking finalists, I read every one of the thousands of submissions, which took days. Some of them read like a bad caricature of a country and western song; you could almost hear the weeping steel guitars as the entrants recited their obviously trumped-up tales of woe. Those, plus the ones that answered "I want it all" and "because I deserve it" to our essay questions, quickly went into the reject pile.

Among the other entrants, however, some interesting patterns emerged. Half of the applicants were women, a proportion far higher than among *PC Magazine* subscribers in general. The applications also revealed a fundamental difference in the way women and men approach technology.

You will not be surprised to learn that most of the guys wanted technology for its own sake or to impress their friends. Most of the women either had a specific application in mind, or they wanted to win in order to please members of their families. One woman wrote, "My home technology is an embarrassment. The other kids make fun of my children's technology."

Another said, half jokingly, half wistfully, that if she won the gear for her husband, maybe he would be proud of her and would give her a foot rub—nah, he hates giving foot rubs. She wasn't alone, however. Lots of women wanted to win technology for their husbands.

The altruistic wives were neatly counterbalanced by the zealous, evangelistic, proselytizing husbands. One male entrant started his pitch by trying the sensitivity route, but ultimately he showed his true, tech-obsessed colors. I laughed out loud when I read that one:

There is no substitute for the love of a kindheart-

ed woman; with your crafty assistance and technological expertise, I would be able to convince her that wide-screen is better than full-screen, and she too would be enlightened and would gaze upon me with the kind of wonder that must have greeted the first man or woman to harness fire and hold it aloft in the darkness of the technologically vacant night.

I also learned of the "man room," a phrase that was previously unknown to me. It's evidently a place where women are forbidden and normal rules of behavior, order, and hygiene are suspended. Some men painted glorious pictures of the tech-fueled parties they'd have in their man rooms, and some benighted women even applied on behalf of their men's man rooms. I rejected all of these applications out of hand. Sorry, but technology in the home should be a uniting force, not a collection of glowing gewgaws for the he-brute's personal cave. And pick up that thigh bone after you're done gnawing on it.

Educators who are desperately trying to keep up with their students, or with the expectations of their schools, entered as well. Complaints such as this one were not uncommon: "As a college instructor, I am expected to utilize the latest digital tools to prepare materials, which I generally have to do and learn at home."

We also saw examples of classroom altruism: dedicated teachers who wanted to win just so they could bring their equipment into their technology-bereft schools.

Maybe I'm old-fashioned, but the cheery descriptions of complete multimedia systems with Internet access in the bedroom left me cold. Music? Sure. TV? I can think of better things to do there. Web surfing via a wireless keyboard? My wife would beat me to death with it—and I wouldn't blame her.

Finally, some of the applications were testaments to materialistic acquisition and naked greed. Contrast that with the person who wrote:

I'm no more deserving than anyone else, but if I were lucky enough to win, I promise you that I would wring every ounce of enjoyment out of my prize, and I would seek every opportunity to make others happy, too.

Now that's a deserving attitude.

Technology in the home should be a uniting force, not glowing gewgaws for the he-brute's personal cave.

MORE ON THE WEB: You can contact Bill Machrone at Bill_Machrone@ziffdavis.com. For more *Extreme Tech* columns, go to www.pcmag.com/machrone.

NEVER GET LOST AGAIN...

SMALLER

The size of a beeper, *Earthmate GPS* packs a lot of power into one small GPS receiver. Measuring only 1 7/8" wide x 2 3/32" long x 13/16" deep, *Earthmate GPS* draws power from the USB port of PC laptops so no batteries are needed. Just plug into your USB laptop and off you go - it's that easy. Track your position in real-time on detailed *Street Atlas USA* maps as well as other mapping software from DeLorme.

FASTER

At the heart of the *Earthmate GPS* is the SiRFstar IIe low-power chipset, with hot-start times of less than 8 seconds and additional technology providing improved GPS tracking in weak signal conditions. This chipset requires 75% less power to operate than comparable chips. Many customers report start-up times under 10 seconds! There is no extra charge for accessing the satellites.

MORE ACCURATE

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ADD-ONS FOR PDA USAGE

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(PowerPack and PDA software available separately.)

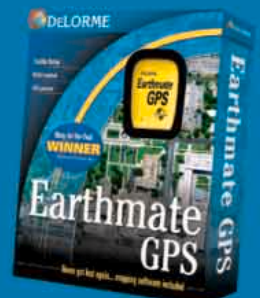


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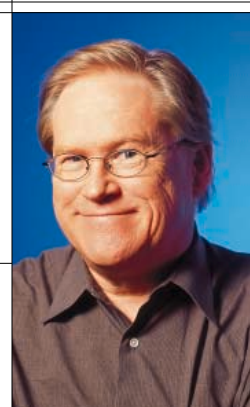


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John C. Dvorak



Kill Microsoft Word

When is the last time anyone talked about Microsoft Word? Here's a program on its last legs that should probably be discarded and rethought completely. It has become a kludge. This is apparent with the latest version in Office 2003.

Let me start out with a couple of my current complaints. My biggest annoyance with the current version is that it keeps reinstalling features, which requires me to reinsert the master disc over and over. I'm not sure if this is a trick to check with Microsoft's database to make sure I'm a registered user or if the program is just stupid.

Here's the scenario. I get a .doc file as an e-mail attachment. I click on it and Word boots. Then I'm told I need to add a feature to read the file. It's always the same feature, apparently. I say Yes to adding the feature. It installs it, then loads the file from the e-mail. The next time I click on the e-mail, the same thing happens, and so on. Obviously the feature is never actually added.

While that was an eye-roller, within six months a more ominous error cropped up. Now when I start Word I get a message saying, "An error occurred and this feature is no longer functioning properly. Would you like to repair this feature now?" It never says what feature it wants to repair. I click Yes and it asks for the disc, and then it repairs the feature—at least until the next time I start Word, when I get the same message.

If I stop repairing, I get another dialog that says, "The document contains macros. Macro language support for this application is disabled. Features requiring VBA are not available. Would you like to open this document read-only?" Whether I click Yes or Cancel makes absolutely no difference, as there is no document involved! I merely started the program. After bypassing these roadblocks, the program runs fine.

I suppose I should reinstall Word, but other people have told me they have the same problems. So why bother?

My irritation with Word began last year when we were finishing *Online! The Book* for Prentice-Hall. The editing required a lot of markups using Word, since the publisher seemed enamored with Word's markup capability, whereby you can track changes. This was great, except that between the various ver-

sions of Windows (Word 97, Word 2000, Word XP, Word 2003, and a couple of Mac versions) used by the authors and editors, we had a huge mess. This was laughable—actually, a nightmare. I concluded that the program is out of control and needs to be scrapped. Users should all be given some new program for an upgrade charge of \$10—just to get everyone on the same page.

Meanwhile, let's not forget the historical issues with Word. Let's list a few.

- **The ever-changing .doc format.** Even saving to older .doc formats or .rtf seldom gets perfect results. I'm always amused by the warning that things will change if I save in some format or other, yet after the save absolutely nothing has changed.

- **Dubious HTML creation.** How hard is it for Word to create a simple brain-dead HTML file without embedding a ton of junk? It can't seem to handle any moderate formatting either. The newest version can create some sort of XML file too, but for what purpose I have no idea. Because its HTML creation is so poor, though, why would I trust it to do anything fancier?

- **Plain-text conundrum.** Users of plain-text editors know that Microsoft has never been able to get Word to generate a simple ASCII file without issues. First, there is no option to create a plain ASCII file. Instead, we can create a variety of so-called "plain text" files, none of which seem to be plain text.

With the newest version of Word, when you want to save plain text you get a dialog box with a near infinite variety of "plain text" options, including a variety of IBM EBCDIC, Icelandic-Macintosh code, and a laundry list of weird options. The user has to now determine if line breaks are to be added and must choose between 4 different EOL (end of line) options and whether or not to allow character substitutions. Microsoft must have concluded that there is no such thing as a plain-text file; this new option box proves it in some sick way.

There are many more issues than these. It's clear the program is in decline, with too many patches and teams of coders passing in the night. It's about time that it's junked and we get something new. This code can no longer be fixed.

Users should all be given some new program for an upgrade charge of \$10—just to get everyone on the same page.

MORE ON THE WEB: Read John C. Dvorak's column every Monday at www.pcmag.com/dvorak. You can reach him directly at pcmag@dvorak.org.

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– Microsoft Windows NT Server Resource Guide*



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Inside Track

As I was **mocking** the emergence of 8-channel audio systems, I realized that we will be stuck with these once the cheap digital amps become ubiquitous. And that looks more possible by the minute.

I had written some years back that the digital audio amp is coming, but so far only very **high-end systems** have emerged. Apparently this delay to market is due to low-end gotchas that stem from **cheap power supplies** and something called “clock jitter.” A number of companies, including Texas Instruments and Cirrus Logic, are making these chips, but Tripath Technology is making the most noise (**no pun intended**).

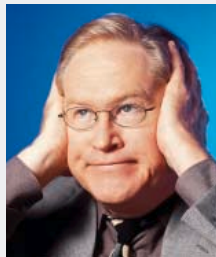
Typically these amps, when they are put into a system, are called class D amps (the “D” stands for digital). Tripath, however, has eschewed this moniker in favor of class T. To make absolutely sure that the class T concept goes nowhere, the company has registered the class name as a trademark. Meanwhile, judging by the increased buzz, we should finally begin to see more and more of these digital amps on the market by Christmas. Next year there will be a **deluge**, as they begin to appear in portable devices.

Browser War II Dept.: The latest breakdown of the Microsoft Internet Explorer browser—which allowed malevolent Web sites to plant **Trojan horses and viruses** in the computers of people who merely visited these sites—has resulted in a new interest in alternative browsers. The two new players are Opera and the open-source Mozilla Firefox, **both excellent**. Unless Microsoft actually does something new with its browser, I think that more and more people will move away from it. This last flaw was **the last straw**. And, by the way, if you use the Firefox browser, be sure to download the “themes” and try them. Very cool.

Both Opera and Firefox use **tabbed browsing**, which is a nice feature that allows the browser to maintain multiple pages at once without multiple windows. The fact that Microsoft hasn’t long since borrowed the idea—first popularized years ago by Opera—seems to be an indication that the company is bored with its own product.

So what is Microsoft working on, anyway? Look for the company to roll out blogging software. Already the company has hundreds of bloggers online with what often appears to be an internal blogging system. Fortunately, many of the Microsoft blogs are **one-post wonders** where the user sets up the blog, makes one entry, then disappears. Whew!

Wi-Fi on the Moon Dept.: I’ve begun a long-term look at 802.11 gear for **long-distance** connectivity. Al-



The problem with 802.11b is that the frequency is the same as that of a microwave oven.

though there are **legal limitations** on how much wattage you can use for 802.11, most of the equipment sold to consumers and small businesses is far under that limit. Most consumer 802.11b gear is 33 milliwatts, for example. The FCC allows up to one full watt of power.

The only company promoting wattage seems to be SMC Networks. As far as I can tell, it is the only one even **mentioning the radio wattage on the box**. Nobody else wants to talk about it. See if you can even find the wattage specification on that laptop with built-in 802.11. SMC makes a PCMCIA card—the SMC2532W—with a 200-milliwatt radio. It has a **range of half a mile** with no special antenna. This should be the perfect addition to the **wardriver’s arsenal**. It sells everywhere for about \$60.

Now there may be some **good public-policy** reasons for not promoting wattage. In my discussion with SMC engineers about wattage, the notion of adding a **dangerous** linear amp to the radio came up. This is what was used during the CB radio fad when **bozos were blowing** out channels with amplified signals. The problem with 802.11b is that the frequency is the same as that of a **microwave oven**. You start amplifying the signal and, as one engineer said, “Someone is going to get hurt!”—or cooked, as it were. “Gee, Honey, isn’t it getting a little warm in the house?”

What Happened to the PDF Format Dept.: Who else is having **trouble** with the newest Adobe PDF viewers? The load time is long, and often the PDF file doesn’t load at all. Sometimes the browser gets locked. Now when I unknowingly click on a PDF file and the Adobe splash screen comes up, I jump and say, “Oh no!” I’m not the only one with this complaint. I’ve tried to reinstall version 5, but once you get version 6 on your system, you’re doomed. The company needs to get this straightened out quickly before people abandon PDF on the Internet. This is happening just at a time when PDF’s popularity is increasing.

Genuinely Interesting Hardware Dept.: How do you turn off the Internet? Do you have a 24/7 high-speed connection but see **no reason** to be online while you’re sleeping? Every millisecond, some hacker is trying to break into your machine as you snooze. Go immediately to www.pathlock.com and buy a nice switch for \$29.95 to **cut the connection** without turning off your routers. The Pathlock e100 timer is very cool and also allows you to shut off the Net programmatically. Give the kids an hour of surfing, after which the timer automatically **shuts off** the connection—highly recommended. It’s an idea whose time has come!

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A recent study concluded that employees spend an average of 75 minutes per day using office computers for non-business related activity (surfing porn, gambling, shopping or even searching for sex online). That translates into an annual loss of \$6250 per employee or more than \$300,000 per year down the drain for a company of just 50 employees.

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Bill Howard



Gadgets Need Mutual Friends

Google ranks the importance of Web pages indirectly, based on how many other pages point to them. This kind of third-party endorsement is a good way to buy MP3 players, cell phones, and notebooks: Look for products supported by and connected to other products.

This don't-risk-going-with-the-underdog thinking is at work when you buy an HP printer instead of, say, a Lexmark, because you suspect that HP ink cartridges will be easier to find. You're just looking out for yourself, even if a faint voice whispers in your ear that this only makes big companies bigger. If you opt for Apple's iPod, there's a voice recorder attachment, a speakers/dock/power module that makes it a mini boom box, a box that lets you control an iPod from your steering wheel, and numerous carrying cases.

But mostly it's about transformer—not corporate—power. On a recent trip to Europe, 9 pounds of my gear was made up of transformers, charging stands, batteries, and proprietary cables. That weight could have been cut almost in half had the products been more universally popular and been able to share common chargers.

If you want to carry the fewest transformers possible, consider a universal power adapter from Mobility Electronics (iGo Juice) or Targus (Mobile Universal AC/DC adapter). Both have power tips for common notebooks, popular phones, PDAs, and a sprinkling of music players and portable printers. With an accessory adapter, each lets you charge a second device at the same time. Here's where popularity comes into play: You're more likely to find an adapter tip for Motorola or Nokia than for Samsung, for Samsung than for LG, etc. And you won't find one for your Philips razor or ultrasonic toothbrush. Sorry.

There's still a long way to go in making universal power systems universal. Here are some suggestions.

- **Three power outlets.** Both Mobility and Targus have \$20 adapters that let you charge second devices. But which device do you choose? Phone? Music player? I'd like to see universal transformers that can charge a notebook and two additional devices. Otherwise, you have to remember to stumble out of bed at 2 a.m. to change the device being charged.

- **More power.** For a universal power transformer 70 watts is passable, but you really want 90W or 120W, especially if you have to power desktop replacement notebooks using desktop CPUs.

- **Better labeling.** One reason I took individual transformers is because you have to look up numbers on a compatibility sheet to match each device with the right tip. I was running short on time before the plane left, and I feared if I scooped up all the tips, I'd miss the one I really needed. I don't know what fits the iGo tip 116 or the Targus tip 7 without the scorecard. For now, invest in a Mylar-label printer.

- **USB power devices (no transformer needed).** Some external drives can be powered by USB current, allowing you to leave that transformer behind. With optical drives, make sure there's enough power for both reading and burning discs.

- **USB charging.** Some products such as music players, PDAs, and cameras that use USB for file transfer can be trickle-charged by your notebook's USB adapter. Sometimes there are gotchas: For instance, some PDAs only come with a sync cable, but Belkin, for instance, will sell you a sync-and-charge cable for \$20; it makes you wonder why the vendor didn't include the better cable with the PDA. The Dell DJ music player can be recharged by USB, but only if the battery hasn't fallen below 25 percent power. This uncertainty leads to your carrying the transformer "Heck, it's only 6 ounces"—just in case.

- **Always-powered notebook USB jacks.** If USB charging is to work, there must be an option that lets your notebook hibernate but still keeps USB power alive for trickle charging. A group of a dozen writers and industry analysts (me included) have told Dell, HP, IBM, and the like that this is a must-have feature. We'll see which vendor responds the soonest.

Before you buy and before your trip, do some homework. See if the product you're considering has an iGo or Targus power tip. See if it can be trickle-charged by USB and whether that cable is a standard or third-party option. See who has gadgets that provide alternative power sources; check the Belkin, iGo, and Targus sites especially. Belkin, for instance, has a cigarette-lighter-to-USB power adapter into which you can also plug an LED light, making a car map light. And when you're recharging your devices in an unfamiliar hotel, be sure that what seems to be the light switch doesn't actually turn off the power to your daisy chain of power-depleted gadgets.

If you want to carry the fewest transformers possible, consider a universal power adapter.

MORE ON THE WEB: You can contact Bill Howard directly at bill_howard@ziffdavis.com. For more On Technology columns, go to www.pcmag.com/howard.



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SOLUTIONS

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Windows Your Way

Use the Group Policy Editor to access hidden security and customizations in Windows XP. **BY DAVID A. KARP**

One thing that makes Windows such an effective platform is its great flexibility: Nearly everything that (on the surface) seems to be hard-coded can be tweaked, turned off, or reconfigured. To that end, Windows XP has the Group Policy Editor (GPE), a tool that lets you not only tinker with the OS but also lock down many of its vulnerabilities.

The GPE has been around since Windows 95, but because it's a power tool, Microsoft has always chosen to hide it (much like the Registry Editor). This is understandable, as there is some potential to wreak havoc, but the GPE's point-and-click design makes it much safer than changing the same settings in Regedit.

Note that the settings discussed here are available in Windows XP Professional; some may not be present in XP Home.

The nickel tour. To open the GPE, go to *Start | Run* and type in *gpedit.msc*. Those familiar with the Registry Editor or Windows Explorer will feel at home here. There's an expandable tree on the left from which categories are selected and a details list that shows the settings in the selected category on the right.

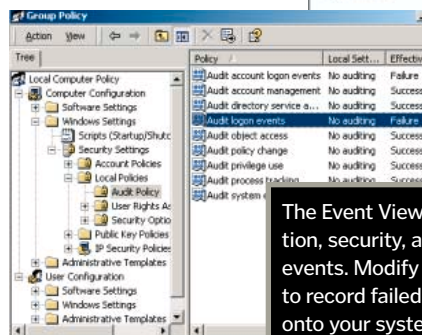
Branching off the root are two main categories: Computer Configuration and User Configuration. Each branch consists of similar subcategories. Settings in the User Configuration branch affect only the current user (you), while those in the Computer Configuration branch affect all users, plus instances where there is no user, such as the log-on box (or Welcome screen). If similar settings in both areas conflict, the one in the Computer Configuration branch takes precedence.

The categorization of the settings in the GPE can seem haphazard, so you may want to spend a few minutes digging around. The setting names are usually accompanied by a lengthy description, so most settings

should be self-explanatory. To change a setting, double-click on it and choose the option you want in the box that appears.

Here are ten of the more useful settings to get you started with the GPE.

1. Dress up Internet Explorer. You can change the look of



the IE window, either customizing it to suit your taste or undoing customizations made by your ISP or system manufacturer. Go to *User Configuration | Windows settings | Internet Explorer Maintenance | Browser User Interface*.

Double-click on the *Custom Logo* setting to replace the little globe button on the toolbar with your own image (or uncheck the boxes to revert to IE defaults). Double-click on the *Browser Toolbar Customizations* setting to specify any BMP image file as background wallpaper for your IE toolbar. You can also open the URLs folder (right below the *Browser User Interface*) to tinker with IE's Favorites and Links menus, or change the URLs used for the search bar and the *Online Support* menu item (in Help).

2. Start-up and shutdown scripts. You can have Windows run a script whenever the computer is powered on and another just before it shuts down. For instance, write a start-up script to copy the latest version of some document off a server and a shut-

down script to copy it back to the server. Or have all the computers in your office run the same script (presumably on a central server) to check for updates, scan for viruses, or do some other task. Go to *Computer Configuration | Windows Settings | Scripts (Startup/Shutdown)*, and double-click on *Shutdown*. Click on *Add* to choose a .VBS (VBScript) file on your hard disk.

The corresponding settings in the *User Configuration | Windows Settings | Scripts*

(*Logon/Logoff*) folder work similarly, except that they're activated every time you log on or off. Settings affecting how all of these scripts work are located in *User Configuration | Administrative Templates | System | Scripts and Computer Configuration | Administrative Templates | System | Scripts*.

3. Turn off CD/DVD autoplay. The Windows Autoplay feature is responsible for automatically detecting, identifying, and playing CDs and DVDs when you insert them. To disable the feature so that no discs are ever played automatically, go to *Computer Configuration | Administrative Templates | System*, double-click on the *Turn off Autoplay* option, and click on *Enabled*.

4. Disable user tracking. If you hate having Windows record every program you run, every document you open, and every folder path you view, try turning off its User Tracking feature. Go to *User Configuration | Administrative Templates | Start Menu and Taskbar* and enable the *Turn off user tracking* feature. This disrupts features that rely on user tracking, such as personalized menus and the *My Recent*

68 OFFICE:
Map your Excel
data.

**70 SECURITY
WATCH:**
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**72 INTERNET
BUSINESS:**
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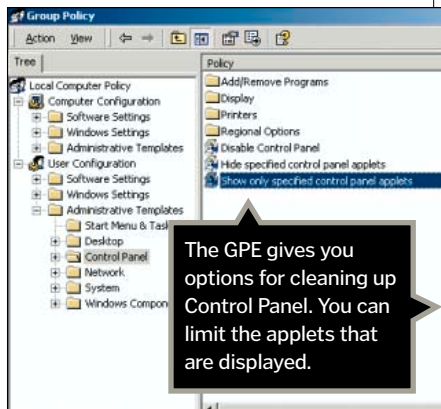
**74 INTERNET
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Documents section of the *Start* menu.

5. Log more security threats. What if you want to keep better track of what others are doing on your computer? By default, the Event Viewer (*eventvwr.msc*) tracks application crashes, driver failures, and some security breaches. But you can expand its powers with the Group Policy Editor and its *Computer Configuration | Windows Settings | Security Settings | Local Policies | Audit Policy* branch. For instance, if you set both the *Audit account login attempts* and the *Audit login attempts* settings to *Success*, the Event Viewer will record failed attempts to log onto your system.

Note that the use of *Success* and *Failure* can be a little confusing. Choosing *Success* for these settings means that you'll log the instances in which your security policy has worked as it should, such as when your



computer keeps out an intruder. Conversely, *Failure* logs those times when security has been compromised on your system.

6. Lock down Internet Explorer. If you've ever set up a computer for the public to use, you know that sooner or later someone will mess it up or try to access something he or she shouldn't. To let the PC act as a "dumb" Internet terminal, with only a Web browser and a mouse, start by disabling context (right-click) menus. Go to *User Configuration | Administrative Templates | Windows Components | Internet Explorer | Browser menus*, double-click on *Disable Context menu*, then click on *Enabled*. There are dozens of similar settings in the neighboring branches to help simplify and secure IE.

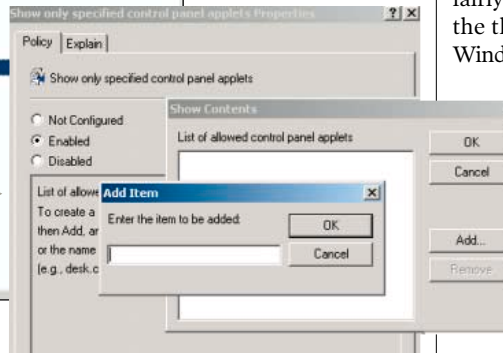
7. Clean up the Control Panel. Whether you want to hide sensitive settings from

the users of the computers you administer or you just want to reduce clutter on your own system, you can use the Group Policy Editor to remove unwanted icons from the Windows Control Panel. Go to *User Configuration | Administrative Templates | Control Panel* and double-click on the *Show Only Specified Control Panel Applets* setting. Click on *Enabled*, and then click on *Show*.

If this is your first visit to this box, it will be empty. It's up to you to populate the list with "allowed" applets (CPL files responsible for your Control Panel icons). Click on *Add* and then type in the filename of each CPL file you wish to allow.

For instance, type in *mouse.cpl* for the Mouse Properties icon. To see a list of all the CPL files on your computer, open your *Windows | System32* folder and sort by type.

8. Configure your Places bar. Choose the folders that appear in the gray Places bar on



the left side of most *File | Open* and *File | Save* dialog boxes by going to *User Configuration | Administrative Templates | Windows Components | Windows Explorer | Common Open File Dialog, Items Displayed in Places Bar*, click on *Enabled*, then type in the full pathnames of the folders you wish to appear.

Tip: There is a quick way to specify folder paths without having to type them. Just open Windows Explorer, navigate to the folder you want, and highlight the text in the Address bar (go to *View | Toolbars | Address Bar* if it's not there). Press Ctrl-C to copy the text, then press Ctrl-V to paste it into the Group Policy Editor.

Note that these settings will not affect

Microsoft Office dialogs; you can configure these from within Office. You can also use Creative Element Power Tools (www.creativelement.com/powertools) to customize both Office and non-Office dialogs.

9. Set stricter password rules. You'll probably want to enforce certain password rules rather than expecting your users to take security seriously on their own. In the *Computer Configuration | Windows Settings | Security Settings | Account Policies | Password Policy* folder, you can set the minimum password length (in characters) as well as the maximum password age (in days). And if you really want to be a bear about security, turn on the *Password must meet complexity requirements* option to prevent your users from using their pets' names or birthdays as their passwords.

10. Beef up your firewall. The Security Center is the home of the new firewall built into Windows XP Service Pack 2. Though a substantial improvement over the firewall software in the original XP release, it's still fairly rudimentary. And when you kick in the threat from viruses and spyware, no Windows system is safe right out of the box.

Still, you can use the Group Policy Editor to lock some of the back doors Microsoft has left open.

Go to the *Computer Configuration | Windows Settings | Security Settings | IP Security Policies on the Local Computer* folder, open the Action menu, and select *Manage IP filter lists and filter actions*. Here, you can filter the network traffic that travels into and out of

your computer, based on the IP address of another computer (or even an entire subnet) and the type of data. Click on *Add*, then follow the instructions in the Filter Wizard to set up a new rule.

Throw away the key. The options you set in the Group Policy Editor are made in the Registry and elsewhere. Once you've locked down your system, you can delete (or just hide) *gpedit.msc*, thus preventing others from undoing your changes and wreaking havoc on your computer.

David A. Karp is a compulsive tinkerer and the author of Windows XP Annoyances, 2nd Edition, and eBay Hacks (O'Reilly). He can be reached at david@ebayhacks.com.

OFFICE

Mapping your Data

If your Excel presentation contains geographical data, why not display it on a map? **BY HELEN BRADLEY**

When you're working with geographical data, sooner or later you'll probably want to plot it on a map. Prior to Excel 2002, Excel contained a tool to create maps from its data. But with newer versions, you need special software such as Microsoft MapPoint 2004 (\$299; varies by country) to create map-based charts. MapPoint can work both within Excel and on its own; here we will explore MapPoint's integration with Excel.

How you create and prepare data largely determines how easy it is to map that data. You need a list with enough information for MapPoint to identify locations. To plot by state, you need a column in your data table for the two-character state name abbreviations. To plot by county, you need the county and state, in separate columns. To plot addresses, you need columns for address, city, ZIP code, state, and so on.

MAPPING INSIDE EXCEL

Use the sample data in Figure 1 to create a simple MapPoint map in Excel. Type this data into a range of cells and save your worksheet; MapPoint can't use the data until the worksheet is saved.

Select the data, including the headings, and click on the *MapPoint* button on the Excel toolbar. A MapPoint map and the *Link Data Wizard* dialog, where you tell MapPoint about your data, appear.

The first column should already be identified as *Data Type: State*; if it's not, select it now. The second column will probably be wrongly identified as a 3-digit ZIP code; if it is, select *Other Data* from the list. If you don't do this, MapPoint will plot the third column (*Sales 2003*) using column two as the location ZIP code and you'll end up with data locations in Alabama, Iowa, Virginia, and Ohio—not what you want. Ensure that the *Sales 2003* column has a data type of *Other Data* and click on *Next*.

MapPoint will ask you to identify a primary key; for our data, this is the *State* column, so select this and click on *Finish*. You now have a map of the U.S. with pushpins

in the states of WA, CA, NV, and OR—not a particularly useful result. To show anything more meaningful, you must customize the map.

To edit the chart—we'll convert the pushpins to small charts—click on the

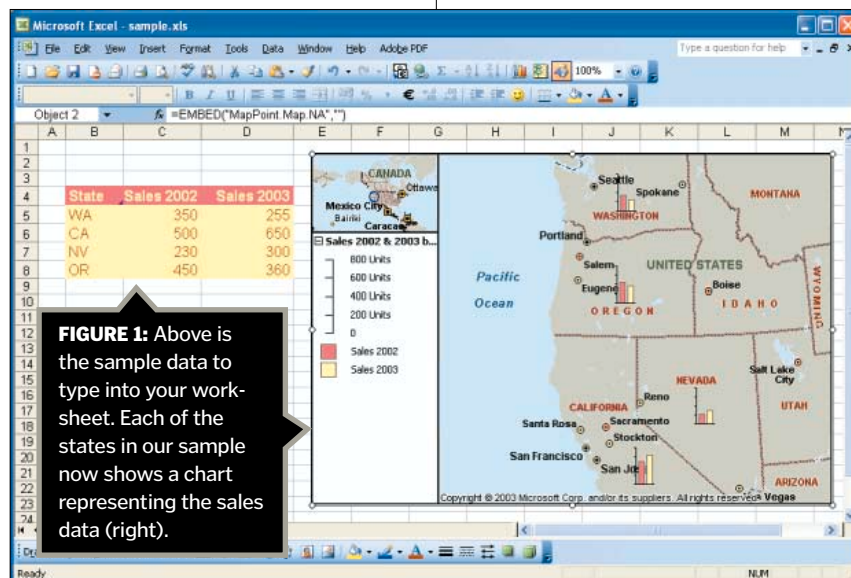


FIGURE 1: Above is the sample data to type into your worksheet. Each of the states in our sample now shows a chart representing the sales data (right).

Data Mapping Wizard button on the toolbar and choose *Column Chart*. Click on *Next* and on *Next* again. Check the boxes for both *Sales 2002* and *Sales 2003*, and ensure that *State* is selected in the "Show the data by" area. Click on *Next*.

You can now configure the data ranges. They'll look better if they're rounded numbers, so set the start value to 0 and the end value to 800; this range encompasses all our data and divides neatly into four parts. On the right of the dialog, type the *Range* labels to match the new range values. For the *Legend* title, type "Sales 2002 & 2003 by State" and click on *Next*, then on *Finish*. You now have small column charts on your map.

To remove the map clutter, choose *View | Map Style | Data Map*. To update the map when you alter the worksheet data, select the map and choose *Data | Update Linked Records*.

OTHER OPTIONS

You can also go the other way and create a map in MapPoint by importing Excel data. In this case, your data must begin in the first row of your worksheet with column headings (not the title). In MapPoint, choose *Data | Import Data Wizard*, select your worksheet, and then identify the sheet with the data. If you intend to link the map to the data (*Data | Link Data Wizard*), you will need a column containing data unique to each record to configure as your primary key (like the *State* column in our earlier example). MapPoint uses this

unique value to identify records when updating them.

There are many more mapping options to experiment with. Shaded maps display different-colored areas according to your data values, and there are also shaded and sized pie and circle charts. MapPoint includes demographic data, which you can combine with your own data; for example, to plot sales against populations, age groups, or income levels.

Interested but not convinced? To evaluate MapPoint, order a 60-day trial version (\$7.95 for North America; \$12.95 for North America and Europe) from www.microsoft.com/mappoint/2004/trial.mspx.

Helen Bradley is a contributing editor of PC Magazine. She specializes in writing hands-on tutorials. Her columns appear regularly in a number of publications in Australia, Canada, the U.K., and the United States.

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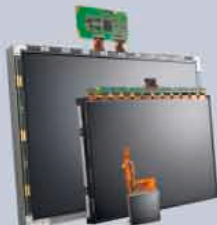
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SECURITY WATCH

Hack Your Own Update CD

Who needs an Update CD from Microsoft? Here's how to create one of your own. **BY LARRY SELTZER**

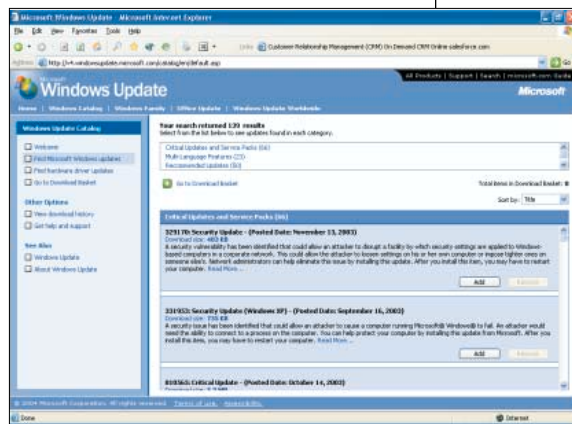
Keeping your Windows system up to date with the latest security patches goes a long way toward helping you keep safe from many of the worms circulating the Internet. But many of Microsoft's updates aren't small. Dial-up users—especially those who have fallen behind and haven't updated for a while—may find that such files can take a

Safe" in our August 3rd issue.)

First, point Internet Explorer to the Windows Update Catalog at v4.windowsupdate.microsoft.com/catalog. Click on *Find updates for Microsoft Windows operating systems*. You'll see a box listing lots of Windows versions. Be careful which version you choose. The updates available for Windows XP SP1 and Windows XP Professional SP1, for example, seem to be quite different; with the latter, I didn't see any security fixes. After selecting your operating system and language, press

Search.

You'll see a list of categories of updates, with the most important one, *Critical Updates and Service Packs*, at the top. Click on it and a list of updates appears below. Click *Add* for each one you want and it will be added to your download basket as if you were shopping on a commerce site. Don't just click



IF YOU HAVEN'T been conscientious about keeping Windows up to date, you'll have a lot of updates to download.

long time to download. This has made dial-up users among the weakest links in the online community.

Briefly last February, when Microsoft issued an update CD, it seemed like there might be an easy solution. No matter how far behind you were with the updates, you could catch up in a hurry. Unfortunately, after releasing that one CD, Microsoft seems to have let the idea pass. Too bad.

But guess what? You can make a CD yourself. Using a little-known feature of the Windows Update site, you can download the updates individually and apply them yourself. It's a great way to help out friends and relatives still stuck with a dial-up connection: They're far more likely to stay safe with a CD in hand. (For more on helping others, see "Keep Your Friends

on everything, though. If you read carefully, you'll see a lot of stuff you don't need, like updates to a foreign-language version of Windows or updates just for the Media Center Edition. When you're done, click on the *Go to the download basket* link. From here, click on the browse button to find a location to which you can download the files. Fill it in and click on *Download Now*. After you accept a bunch of agreements, the downloading starts.

In the list of updates, you might have noticed that some are labeled "cumulative updates." This is another reason why Microsoft should be handling the job. If you go through each one, you'll be applying a bunch of redundant updates.

There's no easy way around this problem, but there is a hard one. After your

THE LOOKOUT

SPYWARE WINS A ROUND

On June 28 Merijn Bellekom, the prolific programmer and spyware crusader, announced the final update of CWS shredder, the standard for removing the infamous CoolWebSearch (CWS). CoolWebSearch is the name of a variety of different browser hijackers, all of which redirect users to coolwebsearch.com and other sites affiliated with its operators. Merijn, a graduate student at the University of Utrecht in the Netherlands, single-handedly wrote and supported CWS shredder in his spare time. He has updated the program to remove each new variety of CWS but states in a farewell note, "I simply do not have the tools to remove the latest variants, they are too aggressive or complicated to allow automated removal by CWS shredder."

Even without updates, Merijn's Web site, www.spywareinfo.com, provides a wealth of tools and information, from utilities for troubleshooting browser hijacks to in-depth Windows processes analysis. And the active SpywareInfo help forum, which is staffed by volunteers, will continue to operate.—Jay Munro

download is complete, you'll see a Download History listing all the updates you just acquired and the dates of their issue. Working backwards from most recent, when you find a cumulative, or roll-up, update, open the description and read it to determine which older updates you can cut from the list and delete from the download directory.

To apply all the updates, you'll have to do a lot of rebooting, but you may be able to limit the number of reboots using some of the tools Microsoft provides. See "How to Install Multiple Windows Updates or Hotfixes with Only One Reboot" at support.microsoft.com/default.aspx?scid=kb;en-us;296861&Product=win2000. Read carefully; this stuff works only sometimes.

We can't emphasize this too much: Running an update CD every few months is not a panacea. To keep your system safe, you need to be very conscientious about updating Windows. When you're through playing catch-up, don't forget to enable Windows Update so you can get patched on a regular basis. Once you're up to date, incremental additions won't be overwhelming, even over a dial-up connection.

Larry Seltzer is the editor of eWEEK's online Security Center (security.eweek.com).

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INTERNET BUSINESS

WebEx Exposed

WebEx relies on a mini Internet for running secure business meetings online. **BY SEBASTIAN RUPLEY**

If you were the head honcho of a major airline, you'd be plenty scared of WebEx. The Silicon Valley-based company owns 67 percent of the surging global market for Web conferencing, according to a recent report from market researchers at Frost & Sullivan. WebEx dominates players as big as Microsoft, and its annual revenues have jumped from \$81 million in 2001 to \$189 million in 2003, making it one of the fastest-growing technology companies.

WebEx Communications Inc. was founded in 1996 just as the Web-wild business bubble was expanding, but post-bubble limits on travel purse strings and widespread broadband adoption are the trends benefiting the company now. Over 9,000 businesses use the browser-based service for online meetings.

The company's secret sauce is a global, proprietary, IP-based multimedia network of switches, running parallel to the Internet and called the MediaTone Network. What's a switch? It's like a server, running Linux, with proprietary routing software that handles the connection between you and a remote meeting partner, similar to how telecommunications companies route calls. When you join a WebEx meeting, you are connected to the nearest switch and then to a WebEx network operating center.

"Our network is basically a small, private subset of the Internet," says Praful Shah, a vice president at WebEx. "There are two big benefits to having it. One is that we can preserve high-speed connections for sending data, voice, and video back and forth. And another is that once your meeting is done, no record of it is stored on any of our servers, which preserves security."

WebEx uses SSL encryption and firewalls to keep meetings secure. One leg of the meeting, however, is trafficked on the public Internet: Your ISP handles the data during "the last mile," the segment going to and from your browser. "Other Web conferencing services are entirely soft-

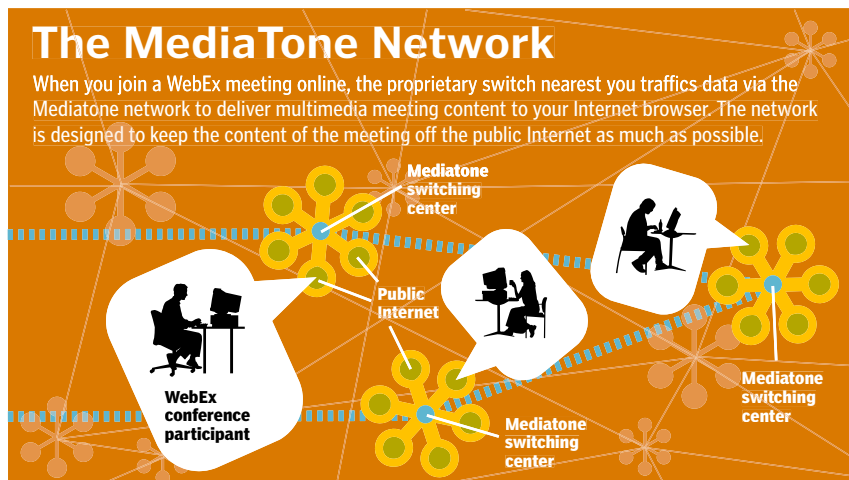
ware-based," says Shah. "They store and forward data using database servers, very much like a database-driven Web site. Security is a big problem with many of the services because the servers sit on the public Internet—outside firewalls."

One company that makes heavy use of WebEx is Agilent Technologies, which cites security and travel savings as reasons for the choice. "We average 4,000 WebEx meetings per month, which is approximately 200 meetings per day," says Rich Nielsen, senior IT engineer at Agilent. "Many of those meetings would have required travel."

toolbar to schedule WebEx meetings on their calendars.

Once a Meeting Center session is underway, participants can share several kinds of multimedia content. For instance, you can have a videoconferencing pane open on one side of the screen and have a shared presentation—complete with animations, CAD drawings, and more—open on the other side. You can also use a note-taking panel to jot things down during the presentation. The leader of the meeting can use drawing tools to annotate parts of a presentation for everyone to see.

Meeting Center also offers full-duplex Voice over IP so several people can speak concurrently during a VoIP conversation. (Participants can also use phones for the audio portion of a meeting.) "A key difference between these meetings and a phone conference is that you can show people things, whether it's a product or a presen-



WebEx offers versions of its service designed for providing product support, training, Web seminars, and more, but its Meeting Center is the central service. A basic subscription to Meeting Center costs \$100 per user per month, though volume discounts are available. You can launch a Meeting Center session in several ways. You can send a link to all meeting participants by e-mail, and they can click on the link to join the session or navigate from WebEx's Web site to a page set up for joining meetings. Microsoft Outlook and Office users who frequently join WebEx meetings can use a toolbar icon to join meetings. Outlook users can also use a

tation," says Shah. The company's network is a work in progress, regularly adding support for new switching standards and APIs so that more applications can be integrated with online meetings.

WebEx faces competition in serving cost-conscious businesses that remain averse to air travel. Microsoft acquired Placeware last year, and its LiveMeeting conferencing software is growing in popularity and is tightly integrated with Microsoft Office applications. Raindance, Centra, and others are also competitors. But WebEx is placing its bets on its own network and its ability to ensure the security of online meetings.



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INTERNET PROFESSIONAL

PDFs on Your Web Site

Here are some tools that can help you generate PDFs dynamically. **BY JOHN CLYMAN**

Web pages often don't translate well into printed output. We've all seen content that runs off the side of the paper, pages that break at inappropriate points, and text that's onerous to read because it runs on in a single wide column. PDFs, on the other hand, give you much finer control over the layout of complex, multipage reports and forms.

Despite this, you may have hesitated to provide PDFs on your Web site because they can be problematic. Not only must visitors to your site have a PDF-aware browser plug-in (the vast majority do), but they must wait for the plug-in to load and then, one hopes, avoid being distracted by notifications about available upgrades.

Then they have to cope with an altered interface that violates expectations of how Web sites should work: Browser toolbars and keyboard shortcuts, for example, are supplanted by PDF-specific navigation and commands that don't integrate well with existing browser capabilities. Topping it off, documents designed for print often present information in ways inimical to online viewing, such as using lengthy side-by-side text columns. All this dramatically increases the potential for frustration.

But these are all arguments for using the right tool for the right job: Use PDF for documents that require fidelity and for displaying long documents, especially those that need search, such as product manuals. Leave the rest to HTML.

If most of the PDFs on your site will derive from static sources, then converters in standard desktop applications like Adobe Acrobat may suffice. But if you want to go a step further and generate PDFs dynamically in cooperation with your Web server, you'll want to explore a different set of tools. Fortunately, Adobe has made the PDF specification public, and numerous companies and open-source initiatives have developed products to generate dynamic, database-driven PDF files on demand.

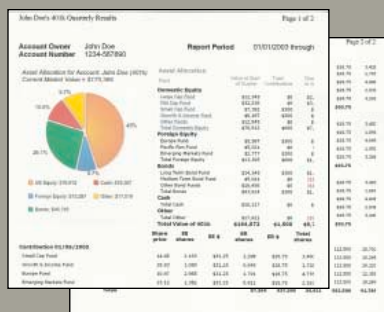
Techniques for dynamically generating server-side PDF files vary, but most fall into three broad categories that we'll call

explicitly programmatic, markup-driven, and autotranslating. The explicitly programmatic tools typically expose an API or object class that lets you write a program to construct a PDF document piece by piece. Products in this category include ABCpdf for ASP or .NET (\$329, www.websupergoo.com), the PDFlib library for PHP (\$450 per CPU, www.pdflib.com), the FPDF library for PHP (free, fpdf.org), and The Big Faceless Java PDF library (\$700 and up, big.faceless.org/products/pdf/).

tors, makes the task of generating PDFs even easier—they take your existing HTML pages and simply re-render them on demand as PDFs. That means there's no need to make changes to your server-side code to generate two separate output streams, one for HTML and one that will ultimately become PDF. In addition to saving labor, these tools are well-suited to producing more printer-friendly versions of existing pages.

Autotranslation tools include Corda's Highwire (\$6,495 single-threaded, \$14,495 multithreaded, www.corda.com) and the activePDF WebGrabber and activePDF Server combination (\$1,594 and up, www.activepdf.com). With Highwire, you simply install the server software alongside your Web server; then, when a user visits a modified URL like "www.mysite.com/page.html?"

HTML IN PRINT



PDF IN PRINT



Writing code line-by-line to generate PDFs in this fashion gives you precise control over the results, but is labor-intensive and can lead to maintenance headaches. Markup-driven tools, which translate tagged text into PDF files in much the same way that browsers translate HTML into Web pages, will likely be more comfortable for many Web developers. With a markup-driven tool, you can generate HTML dynamically with the same back-end software you normally use but adapt it to generate parallel markup (often XML-based) that will be rendered into a PDF.

Markup-driven tools include the Apache project's FOP (free, xml.apache.org/fop) and ReportLab's RML2PDF (part of ReportLab Enterprise Solutions, \$25,000 per CPU, www.reportlab.com).

The third category of tools, autotransla-

@_DOC_LOAD," that invokes Highwire's translator on the underlying Web page, "www.mysite.com/page.html." The user sees the result as a PDF document in his browser.

Highwire interprets HTML to produce results suitable for printing. For further control over formatting, Highwire lets you embed additional hints and directives in HTML comments. The upshot is that you can produce a single HTML document that looks great both on the Web and when converted to PDF for printing.

Creating PDFs on your site can make a lot of sense. And it doesn't have to spell headaches for you or for your users if you have the right tools at your disposal.

John Clyman is a contributing editor of PC Magazine.

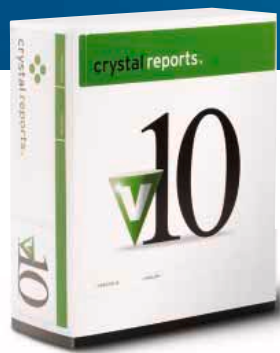
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Customizable templates for faster, more consistent formatting	●	●			●	●
Repository for reuse of common report objects across multiple reports ⁴		●			●	●
Data Access						
PC-based and Microsoft® ODBC/OLE DB for MS Access and SQL Server	●	●	●	●	●	●
Enterprise database servers (ODBC, native)		●	● ¹	● ¹	●	●
Custom, user-defined data through JavaBeans™				●	●	●
Custom, user-defined data through ADO and .NET			●		●	●
Report Integration						
Report viewing APIs (.NET and COM SDKs)			●		●	●
Report viewing APIs (Java SDK)				●	●	●
Extensive report viewer options (DHTML, ActiveX, Java Plug-in, and more)					●	●
APIs for run-time report creation and modification						●
Report Parts for embedding report objects in wireless and portal apps	●	●			●	●
Report Deployment						
Crystal Reports components for report viewing, printing, and exporting:						
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b) .NET reporting component			●		●	●
c) COM reporting component					●	●
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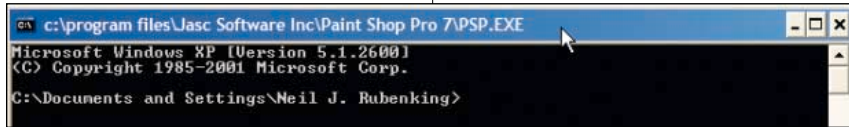
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USER TO USER

PC MAGAZINE'S COMMUNITY OF EXPERTS AND READERS



WHEN USING Windows XP's *Start* command to start a program, you need to include an empty pair of quotes on the command line. If you don't, you'll see the program name and path in the title bar, but the program won't start.

Using the Start Command in XP

I'm having some problems trying to run a batch file that uses the *Start* command. If I start a program that's in the Windows folder, the program runs just fine. But if I try to start a program that isn't in the Windows folder, it won't start at all. Instead, Windows opens another DOS box with the name of the program in its title bar. I'm using the standard-syntax *Start* "program path." This syntax worked just fine under Windows 98, but now that I'm using Windows XP, it doesn't. If I omit the *Start* command and just include the program name, the batch file will start the program, but it waits as if I put *Start /W* in front of it.

PETER HAMPTON

As it turns out, the command is doing just what it's supposed to do. Under Windows XP, *Start*'s very first argument is an optional window title, in quotes. When you put the full pathname on the command line in quotes, *Start* treats it as a window title. For example, suppose you use this command line:

```
START "C:\Program Files\Jasc Software Inc\Paint Shop Pro 7\PSP.EXE"
```

This will create a Command Prompt window whose title is the specified path. The solution is simple: Insert an empty pair of quotes ahead of the path, thus:

```
START "" "C:\Program Files\Jasc Software Inc\Paint Shop Pro 7\PSP.EXE"
```

Your program should start without any problem now.—Neil J. Rubenking

Positioning the Taskbar with Dual Monitors

I'm enjoying using your tip on how to extend the Windows desktop across two

screens when running Windows on a notebook (for more information, see "Dual Monitors" at www.pcmag.com/article2/0,4149,1523522,00.asp). But once I have the computer set up to use two screens, I'd rather have the taskbar on the desktop monitor instead of on the laptop LCD. Is there any way to do this?

JO PARISH

It's easier than you think. First, make sure the taskbar is not locked. Right-click on it and make sure the *Lock the Taskbar* option isn't checked. If it is, click on it to uncheck the option. Then click on the taskbar and drag it to the second screen. Windows will try to dock the taskbar to the edge of the first screen, but keep dragging until the taskbar reaches the second screen, after which you can position it however you like. When you tell Windows to stop using the second monitor, the taskbar will automatically return to the laptop monitor.—M. David Stone

Totally Remove a URL from History

I have been using the *PC Magazine* utility *AutoWhat? 2* for some time to clean up my *AutoComplete* data in Internet Explorer. But I can't figure out how to delete individual URLs (not the entire history) from the Address Bar's drop-down box. I've tried highlighting the URL I want to delete and pressing the *Delete* key with no success. Is there a way I can use *AutoWhat? 2* (or some other process) to delete indi-

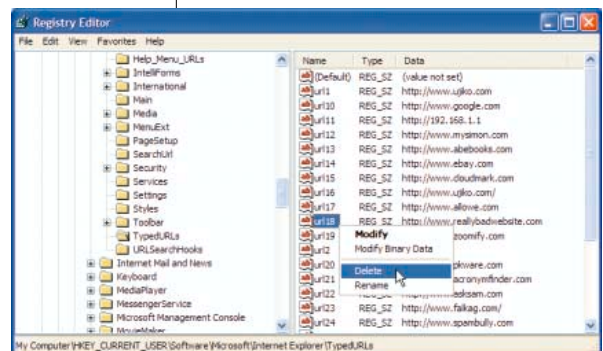
vidual URLs from the Address Bar without deleting all the URLs?

TONY DIVALENTIN

The URLs that appear when you start typing in Internet Explorer's Address Bar are drawn from two locations—your browser History and a Registry key that records URLs you've typed directly into the Address Bar. You'll need to find and destroy the URL in both places. First, click on the *History* button on the toolbar to open the history bar at left. Click on the *View* menu and select *By Site*. If the unwanted URL is present, right-click on it and choose *Delete*.

If the URL wasn't in History, or if deleting it there does not prevent it from showing up in the Address Bar, you'll need to remove its reference in the Registry. Launch *Regedit* from the *Start* menu's *Run* dialog and navigate to the key named `HKEY_CURRENT_USER\Software\Microsoft\Internet Explorer\TypedURLs`. The values in the right-hand pane have names like `url1`, `url2`, `url3`, and so on. Scan the list to locate the one that contains the unwanted URL, take careful note of its name, and delete it.

Now you need to "patch" the list to eliminate the gap created by deleting that name. Find the value whose name includes the greatest number. Note that the values are sorted as if they were text, so `url10` comes before `url2`. Change the name of that highest-numbered value to the name of the value you deleted. If you don't do this, IE will ignore the items after the deleted one.—NJR



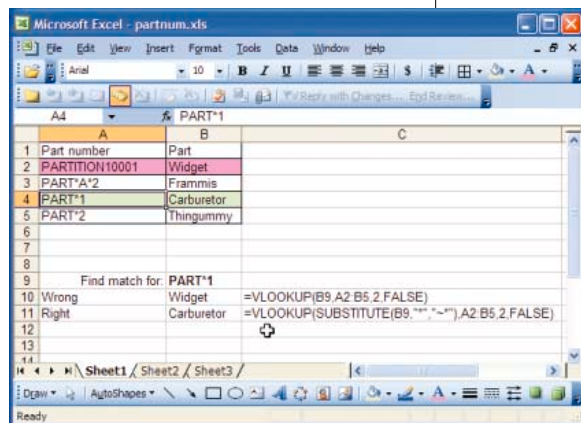
TO MAKE A URL disappear from the Address Bar list, you may have to delete its Registry entry.

Windows will try to dock the taskbar to the edge of the first screen, but just keep dragging.

When you do a Find or Find/Replace operation in Excel, the asterisk is treated as a wildcard.

Asterisk Foils VLOOKUP

Reader Jeff Mayo wrote us about having difficulty using the `VLOOKUP()` function with the `range_lookup` argument—set sometimes to `True` and sometimes to `False`—to try to find part numbers with names like 700*BTM17530A*2*XL and 700*BTM17530A*XL in a huge list. The trouble turns out to be the asterisks in the part numbers. Let's see why.



EXCEL'S VLOOKUP() function needs to know when an asterisk is an asterisk and not a wildcard.

The `VLOOKUP()` function finds a match for a specified value in the first column of an array and returns the corresponding value in another column. If `range_lookup` is set to `False`, `VLOOKUP()` returns only an exact match. If `range_lookup` is set to `True` and the array is sorted on its first column, `VLOOKUP()` will use the largest item less than or equal to the specified value. You wouldn't normally set `range_lookup` to `True` for something like a parts list; you want an exact match.

Why are the asterisks a problem? When you do a Find or Find/Replace operation in Excel, the asterisk is treated as a wildcard representing zero or more characters. A search on "t*r" would match "tear," "terror," and "terminator," as well as just "tr."

HOW TO CONTACT US

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The `VLOOKUP()` function works in the same way. If part number `PART*A*1` or `PART1` or `PARTITION1001` comes earlier in the list than `PART*1`, a `VLOOKUP()` on `PART*1` will erroneously match it. Why? Because it's looking for any text that starts with "PART" and ends with "1" with any number of characters in between, as you can see in our example.

You don't have to change your part-numbering system completely to avoid the asterisk; you can work around the problem fairly easily. In the *Find* dialog, you must use the string "~*" to search for an actual asterisk, and that also works with `VLOOKUP()`. So, in every `VLOOKUP()` formula involving these part numbers, you'll change the first argument, the one that specifies what to look for. Suppose the formula is seeking a match for cell A2. Replace A2 with `SUBSTITUTE(A2,"*", "~*")`. Now the `VLOOKUP()` function will treat the asterisks as asterisks, not as wild cards.—NJR

Inverted Printing in Word

I would like to use Microsoft Word to print a three-fold "Reserved" table sign for our meetings. One third would be blank and form the base of the sign, a second third would have the word "Reserved" printed normally, and the remaining third would be printed upside-down, since people will be looking at the sign from the other side. How can I do this? I've tried printing "Reserved" in two separate passes, but I can never get the alignment right.

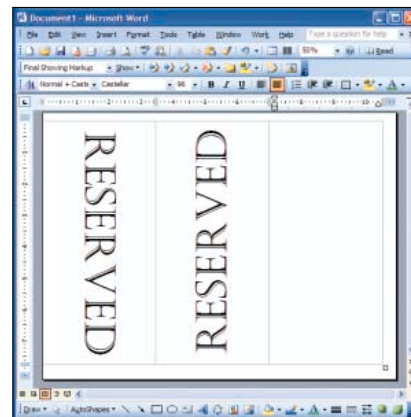
J. A. PATAG

Select *Page Setup* from Microsoft Word 2003's *File* menu and configure the document to use Landscape orientation. Set all the margins to zero and click on *OK*. Word will warn that these margins aren't valid and offer to fix them. When you click on *Fix*, Word will set the margins as small as your printer can handle; note the values it selects. Select *Print Layout* from the *View* menu and adjust the zoom factor so the entire page is visible. Choose *Table | Insert | Table* from the menu. Set the table to use three columns and one row, check the

AutoFit to Window box, and click on *OK*.

Now select *Table Properties* from the *Table* menu, click on the *Table* tab, and click on the *Borders and Shading* button. Click on *None*, so the table borders won't print, then click on *OK*. Still in the *Table Properties* dialog, click on the *Row* tab, check the *Specify height* box, and select *Exactly* in the right-hand pull-down menu. Set the height to a little bit less than the size of the paper minus the top and bottom margins. If a second page appears, reduce the height slightly.

You're almost done. Type the word "Reserved" in the first two cells, leaving the third blank. Right-click in the left-hand cell, choose *Text Direction*, and choose the option that has the bottom of the text pointing left. Right-click in the middle cell and set the text direction the opposite way. Select both cells, right-click, choose *Cell Alignment* from the menu, and choose the



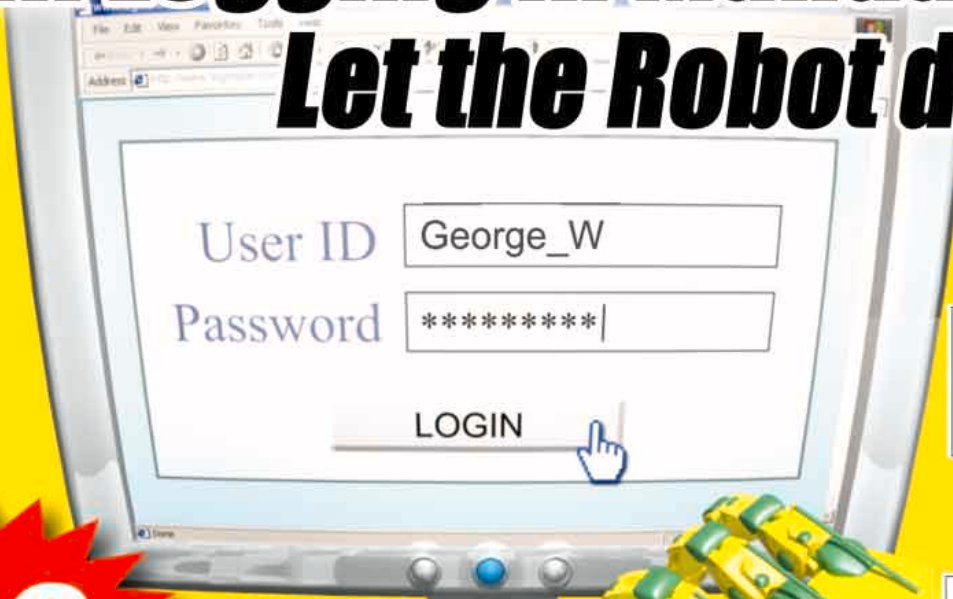
COMBINING SOME of Word's less obvious features gives you new, creative options.

middle item, so the text is centered horizontally and vertically. Again, select both cells and choose the typeface and font size you wish to use. If 72-point isn't big enough, you can type in a larger value. All that remains is to print and fold your signs.

Note that you could employ a similar technique to create a quarter-fold greeting card. Just create a table with two columns and two rows and put the front text in the top left quadrant and the inside text in the bottom right quadrant, each oriented so that the bottom of the text is toward the edge of the paper.—NJR

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- 3-yr parts limited warranty with 1-yr limited onsite service¹⁴

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ServicePac Service Upgrade:

4-yr Onsite Repair/9x5/Next Business Day Response #69P9158 **\$198**

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 - 800MHz FSB
- Microsoft Windows XP Professional
- 256MB DDR PC3200
- 40GB hard drive • CD-ROM
- Norton AntiVirus with 90 days of virus definition updates
- Integrated 10/100 Ethernet
- Lotus SmartSuite Millennium license
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THINK EXPRESS MODEL
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System Features:

- Intel Pentium 4 Processor with HT Technology 2.80GHz
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- Gigabit Ethernet-integrated
- 3-yr limited warranty with limited onsite service¹⁴

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Windows UPDATE

There's
a major
new version
coming,
but the wait is definitely on.

BY SEBASTIAN RUPLEY

Operating systems just ain't what they used to be. For a while, Microsoft released a new version of Windows every two or three years—each creating a ripple effect on how we all used and thought about technology. But now, there's a long wait on. It looks like we won't see even a widespread preview of the next major version of Windows, code-named Longhorn, until the first half of next year; and we'll be waiting for a shipping version until at least 2006 or 2007. That's more than five years after Windows XP shipped in October 2001. Meanwhile, questions are swirling about what will be in Longhorn, and even about whether any new version of Windows can really change the way we use computers.



Windows XP Service Pack 2

SUMMER 2004

Security Center

The screenshot shows the Windows Security Center interface. It features several sections: 'Security essentials' with a progress indicator, 'Firewall' with a 'CHECK STATUS' button, 'Automatic Updates' with a 'CHECK SETTINGS' button, and 'Virus Protection' with a 'NOT FOUND' status. A 'Security Center' label is overlaid on the top left.

Update on Shutdown

Three buttons for system power management: 'Stand By' (power icon), 'Turn Off' (power icon with a red 'X'), and 'Restart' (power icon with a green plus). A label 'Update on Shutdown' is overlaid on the left.

Click Turn Off to install important updates and turn off your computer. [Click here to turn off without installing updates.](#)

Auto Update

A notification box with a green checkmark icon. It contains the text: 'Help protect my PC by turning on Automatic Updates now (recommended)' and 'Not right now'. A label 'Auto Update' is overlaid on the right.

Info Bar notice

A dialog box titled 'Did you notice the Information Bar?'. It explains that the Information Bar alerts users when Internet Explorer blocks a pop-up window or file download. It includes a checkbox for 'Do not show this message again.' and a 'Learn about the Information Bar...' link. A label 'Info Bar notice' is overlaid on the left.

Windows Firewall

The screenshot shows the Windows Firewall settings window. It has tabs for 'General', 'Exceptions', and 'Advanced'. The 'General' tab is selected, showing options for 'On (recommended)', 'Don't allow exceptions', and 'Off (not recommended)'. A label 'Windows Firewall' is overlaid on the bottom right.

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The very success of Windows—it's now on over 90 percent of desktop PCs—has created a technology monoculture that is both resistant to change and a target for malicious hackers. One reason for Longhorn's delay is that all of the recent threats against Windows made Microsoft realize that customers needed more immediate help. As a result, Microsoft focused more on adding new security features to Windows XP Service Pack 2 and getting it out the door (which should happen very shortly). "We actually had to reallocate resources and programmers who were on the Longhorn team to work on SP2," says Greg Sullivan, a lead Windows product manager. Microsoft was making these moves at the same time criticism was raining down on it for the role Windows has played in permitting the propagation of viruses and other computing threats. (For more on this subject, see "Is Microsoft to Blame?" in our August 3 issue.)

In addition to improving security in the underlying Windows code, SP2 will include several enhancements that make it easier for users to configure their systems to be safe—and stay safe. SP2 will automate the installation of critical security patches and turn on an improved firewall by default, and it will include a new security center to monitor the status of OS updates as well as your antivirus and firewall. It also has features that IT managers can use to customize security in enterprises and small businesses.

Because SP2 is the most significant update to Windows that Microsoft plans to release before Longhorn arrives, beta testers are scrutinizing it closely. Some have reported potential compatibility and support problems stemming from the new firewall and automated updates. "Many people are worried about it," says Tom Stachowiak, one of the beta testers, "but it works pretty well. I've run into only one minor compatibility problem. While this may not stop all our security woes, it's a big step forward. My system also runs a lot faster."

LONGHORN RISING

If it's unlikely that any new operating system will have the same impact as Windows 95, Microsoft's Sullivan says his team still has big plans for Longhorn. "Longhorn represents the most significant step in the evolution of the API [application programming interface] since we went from 16-bit Windows to 32-bit Windows," he contends.

Many analysts are skeptical about whether Longhorn represents a revolution. "The peak of the Windows cycle, arguably, came with Windows 95, which was before the commercial Internet model," suggests Summit Strategies vice president and analyst Dwight B. Davis. "There was massive global hype, but ever since then the perceived importance of the OS has been sliding."

Still, some very notable and promising changes are coming in the next version of Windows. The most visible is a new user interface, called Aero. But perhaps more important are a number of under-the-hood enhancements: A new file system called



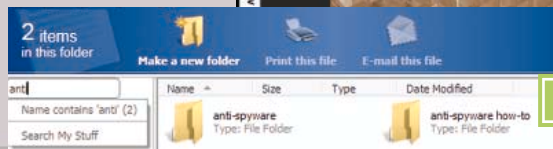
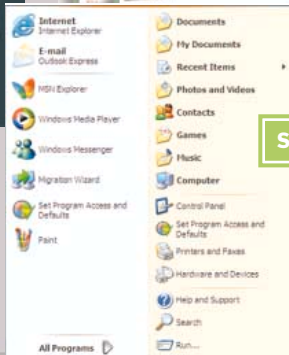
Longhorn 2006-2007?

Desktop Sidebar



Aero interface

Shell additions



Wordwheel search

New architecture

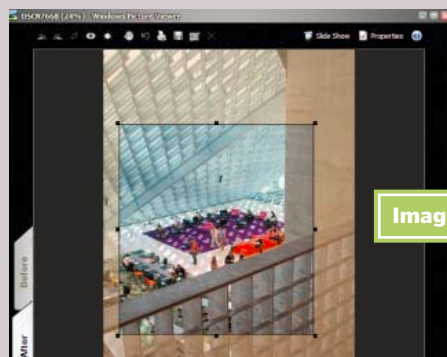
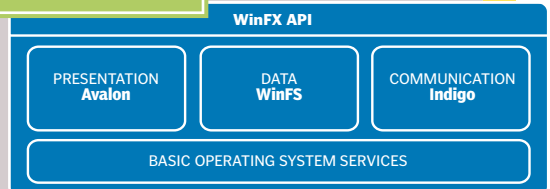


Image editor

What Do You Think?

We asked *PC Magazine* editor-in-chief Michael J. Miller and columnists Bill Machrone, John C. Dvorak, and Bill Howard what they'd like to see in Longhorn—and what they think.

Miller I'd like to see an OS that is perfectly stable, perfectly secure, totally open to cool new apps, and so easy to use I'll never get another tech-



support question. I expect Longhorn will be better, but I don't expect we'll ever get close to perfection. In the meantime, I'll settle for better integration and a more secure environment.

Machrone I want Windows to return to peer-to-peer networking that works and has robust security. The current version has been so crippled by security patches and updates that home LANs are unreliable.

I think we'll get a lot of high-concept visual stuff that will make current users feel outdated. It will sell faster computers and more graphics hardware but won't make anyone noticeably more productive.



Dvorak One of the problems Windows has always had is that it deteriorates from use. People load and offload programs, and over time the Registry becomes a mess. Then the system



runs slower and slower and begins to crash. The only fix is a reinstall. If Longhorn solves this problem, though, there would be no reason to upgrade further. So I expect more of the same.

Howard Third, maybe fourth time lucky? I think we all expected more with XP: more crash protection, more robustness when running a lot of apps, more speed with multiple apps, more resistance to viruses and worms. Maybe Longhorn fixes all that. I'm also hoping for relief in three specific areas: display readability, networking, and new hardware.



WinFS, short for Windows Future Storage, promises to keep better track of all the different kinds of information you store on your PC, from files to e-mail messages; a new communications model, called Indigo, is designed to make using Web services faster, easier, and more secure; and a new graphics layer, called Avalon, enables Aero and other graphics applications. In addition, Longhorn will include a new security model designed to separate critical and secure parts of the system from normal applications.

At May's Windows Hardware Engineering Conference (WinHEC), Microsoft chairman and chief software architect Bill Gates described his vision of why a new version of Windows is needed. His argument centered on better-integrated applications, a more reliable operating system, and stronger security.

In particular, he focused on WinFS, saying the file system in Longhorn will be more database-like, allowing applications to exchange information with each other more fluidly. Microsoft's vision has the file system itself providing all the functions a program might need for storing data, eliminating the need for each program to create its own proprietary file format.

Summit Strategies' Davis and others suggest that people shouldn't hold their breath waiting for a total foundational change with WinFS, though. "There are many reports that Microsoft is paring back its plans there," Davis says. "If the company can pull off a new file system, it will

be a very notable accomplishment, but this effort goes all the way back to the mid-90s and the Cairo operating system." Cairo never shipped, but it contributed elements to the Win NT-based OSS.

Rumors abound on the Web that WinFS has been shelved altogether, but Microsoft's Sullivan says the reports are false. "One big thing driving us with WinFS is storage capacity, which is outpacing Moore's Law," according to Sullivan. He says his team is working on file system enhancements that will take advantage of new storage capacities and introduce better media handling for digital images, videos, and other file formats by directly connecting the files to their metadata. This way, users can search rapidly on criteria such as dimensions, or even the color depth, of images.

Microsoft has circulated early copies of Longhorn to developers, and in this story, you'll see screenshots of the new interface. But Longhorn is a work in progress, so we expect many details to change between now and the time it ships, particularly in the user interface. In the next few pages, you'll find a lot more on Longhorn, a complete look at Service Pack 2 and previews of updates on the Macintosh and Linux platforms.

With Longhorn, Windows is again poised to change the way many of us work, play, and communicate. And with the release of SP2, Microsoft is giving us some breathing room while it finishes Longhorn. We may be willing to wait for style and extras, but we need a lot more security today.

Windows XP Service Pack 2

By Neil J. Rubenking

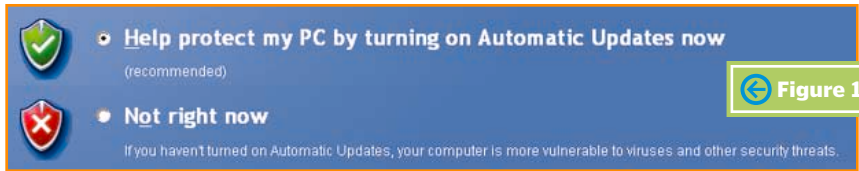
The next major version of Windows may still be hovering just out of sight, but today's security problems are very much with us, looming larger all the time. And though a properly configured Windows XP system with the latest security patches is fairly well protected from most Internet-borne threats, many XP systems aren't set up correctly or fully updated.

Longhorn, the next major Windows update, should ameliorate the situation, but no one can wait that long. As an interim solution, Microsoft will soon release the security-centric Windows XP Service

Pack 2 (SP2) update. (For our initial report, see www.pcmag.com/windows.)

If Microsoft hasn't managed to get SP2 out the door by the time you read this, you should still be able to download the current release candidate at www.microsoft.com/sp2preview.

SP2 is dedicated to enhancing security in a variety of ways. Microsoft had originally planned for SP2 to turn on automatic updates by default to ensure that as many users as possible installed important patches. But this turned out to be illegal in some countries. Instead, users



will be forced to choose “on” or “off” (see **Figure 1**) during installation (or, we assume, on first boot for machines that come with SP2 preinstalled).

Automatic updates currently install only critical patches for Windows; in SP2, they'll install both critical and security patches for Windows as well as some other Microsoft applications. If a download is interrupted, Windows Update will restart at the point where the interruption occurred. At shutdown, if updates have been downloaded but not installed, Windows will offer to install them and then shut down.

The new Security Center keeps essential security information visible. Its tray icon turns red (see **Figure 2**) if there's a problem or yellow if new updates are available. Double-clicking on the icon brings up the Security Center window, showing the current security status in three areas: Firewall, Automatic Updates, and Virus Protection (see **Figure 3**). Though the final lists of supported applications aren't yet available, SP2 will monitor a number of third-party antivirus and firewall products and warn users if they are turned off or out of date. The Security Center also includes direct links to configuration of Automatic Updates, Internet Options, and the Windows Firewall.

Many of SP2's security enhancements are hidden. It offers tighter control of communications protocols like Remote Procedure Call (RPC), Distributed Com-



mon Object Model (DCOM), and Web-based Distributed Authoring and Versioning (WebDAV). The system is protected against buffer-overrun exploits used by many Trojans. The Local Zone Lockdown prevents Trojans from taking advantage of reduced restrictions for programs running on the local machine.

Although these won't make a visible difference in your day-to-day experience, they're important steps toward keeping you safer. Now we'll take a detailed look at three areas where SP2's changes will be apparent: Windows Firewall, Internet Explorer, and Outlook Express.

WINDOWS FIREWALL

If all Windows XP users had enabled the operating system's Internet Connection Firewall (ICF), they would have been protected from worms like Nimda, Blaster, and Sasser. But the ICF was disabled by default, and its low profile meant many users never noticed it. In addition, when users did enable it, the ICF blocked desired tasks like sharing a network printer, except for those users expert enough to open specific ports manually.

Microsoft has learned something from experience: The Windows Firewall in SP2, which replaces the ICF, is substantially easier to use and configure, and offers greater security—and it's enabled by default. And protection now begins the moment the computer boots up. During the boot process,

the firewall watches network traffic by using stateful packet inspection (SPI), checking every incoming data packet against the record of outgoing requests for data. If any incoming packet doesn't match a request, Windows Firewall discards it.

When system initialization is complete, this simple boot-time policy is replaced by Windows Firewall's run-time policy, which may permit incoming traffic on specific ports or for specific programs.

Where the ICF was hidden away on the last tab of the Properties dialog for each network connection, Windows Firewall's status is immediately visible in the Security Center. If it's not on, the Security Center's tray icon will turn red. Users can reach the Windows Firewall configuration page directly from the Security Center. And Windows Firewall settings apply to all network connections.

A complete lockdown by Windows Firewall would provide total protection—but block file and printer sharing, instant messaging, remote access, and other

useful functions. Windows Firewall automatically offers to enable file and printer sharing, restricted by default to the local network. A number of other common exceptions are predefined in the configuration dialog.

Users can also open specific ports to allow incoming (unrequested) packets for any program, or to allow a program unlimited access to inbound traffic on all ports. It's not possible to do both at once—you can't limit a specific program to inbound traffic only on specific ports—but you can limit the scope of each exception to just the local network or to a specific list of trusted IP addresses.

This program-specific exceptions feature is not the same as the “program control” offered by third-party personal-firewall products such as Norton Internet Security and

ZoneAlarm Security Suite. Those products also prevent unknown programs from sending traffic out to the Internet; Windows Firewall does not. But the first time an unauthorized program tries to open itself to receiving incoming packets, Windows Firewall pops up a notice

similar to those you'd see from NIS or ZoneAlarm (see **Figure 4**). Users can unblock the program, keep blocking it without further notices, or block it without changing its “first-time” status.

Corporate administrators can configure Windows Firewall for the entire enterprise, using new Group Policy settings, and limit the ability of individual users to change these settings. Two distinct profiles are available: a domain profile for use when the computer is connected to the corporate network, and a standard profile (typically more restrictive) to be used when the computer is connected outside the company, for ex-



ample when an employee is traveling. In addition, traveling users can check a box to suspend all exceptions temporarily while retaining the settings. For example, you could disable file sharing and Remote Desktop when connected to an unsafe public network and easily restore them upon your return to the office.

Microsoft has included a programmatic interface for Windows Firewall that allows an application to do things like set FirewallEnabled to FALSE, add itself to the list of AuthorizedApplications, or change the configuration of GloballyOpenPorts. Our concern here is that a malicious application could turn off Windows Firewall or, more likely, mark itself as an authorized application. Corporate administrators can disable some or all local configurations, which will prevent programs from making changes; but ultimately, Microsoft maintains, individuals still have to be smart about what apps they run. Even the best deadbolt won't protect your house once you've let the bad guys in.

Although Windows Firewall is a big improvement over ICF, it still doesn't provide all the protection that you'd get from a third-party firewall, even a free one. It won't stop malicious programs from connecting to the Internet. When a program tries to open a port, Windows Firewall won't help users decide whether to allow it. And it can't notify users of intrusion attempts. We still recommend using Windows Firewall only until you can add a third-party personal firewall. But those who don't heed (or never hear) this advice will at least be significantly better protected under Windows XP SP2 than they were before.

INTERNET EXPLORER

While Internet access is indispensable for modern business and home computers, it also enables attacks by spyware, viruses, pop-ups, and other intruders. Security enhancements in Windows XP SP2's Internet Explorer (it's still Version 6) will help keep them out—and won't bug you too much in the process.

To make security warnings less annoying, IE will use its new information bar (see Figure 5), rather than popping up a message box that requires user input. The

info bar appears at the top of the current page, just below the lowest toolbar. IE will point out the info bar at its first appearance. Scripts and automated downloads blocked by IE will be reported here, as will windows blocked by the new built-in pop-up blocker. Users can click on the info bar for a menu of actions appropriate to the particular warning.

The menu for a blocked pop-up, for example, includes options to show the blocked pop-up, enable pop-ups for the current site, or configure the adequate but not outstanding pop-up blocker. With warnings conveniently displayed in the info bar, users won't be tempted to lower their security settings just to avoid annoying messages. Even if they try, they still won't be allowed to relax security below the recommended minimum.

The new Manage Add-ons dialog box provides a single location to view and manage all IE add-ons—including ActiveX controls, Browser Helper Objects, toolbars, and other browser extensions (see Figure 6). The name, type, and

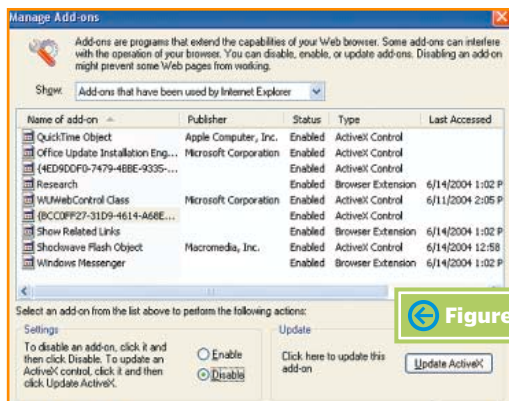
Figure 5



publisher of each add-on are listed, as well as the status (enabled or disabled), and some usage statistics. Users can easily disable any unwanted ones or search for updated versions.

Add-ons that have digital signatures but were disabled because of an untrusted publisher also appear here. Unsigned add-ons with no publisher information are never allowed, so they don't appear. Note that disabling an add-on using this dialog does nothing more than flag it, telling IE not to load it. Alternative browsers, such as Browse3D and MyIE2, that rely on the IE WebBrowser control will have to be rewritten to heed this setting, or the add-ons will still load in these programs.

Corporate administrators can take charge of add-on management, either taking it completely out of the user's hands or creating a list of permitted or blocked add-ons. Finally, Microsoft recognizes that a faulty add-on can destabi-



lize the browser completely. If an add-on crashes IE, the system will identify it and offer to disable it.

At the other end of the process, when IE asks users whether to allow installation of a particular ActiveX control, it provides a link to the publisher's information and to the download's digital certificate. In addition to the familiar "always trust this publisher" option, users can now choose *never* to trust the specified publisher.

SP2's IE can also prevent certain exploits that involve disguising the actual file type referenced by a link. It requires

that the type defined by the file extension match the content type in the HTTP source. Also, using a technique Microsoft calls "MIME sniffing," IE scans the beginning of a file's data for signatures that identify specific file types. For example, EXE files start with the characters MZ and bitmaps with BM. If the file contents don't match the stated file type, IE will reject the file.

Malevolent sites often use certain types of script-generated windows that have characteristics that make them hard for users to close—or even to realize they're present. A window may have its top portion off-screen, putting the menu and toolbars out of reach. It may display entirely off-screen, configured so that a keystroke by the user launches an unwanted download. It may even suppress portions of IE's user interface. In SP2, Internet Explorer foils these exploits by forcing script-generated windows to stay fully visible and by disallowing removal of essential portions of the user interface.

The malefactors who concoct spyware and other intrusions will surely find alternative ways to attack, but at least their old tricks won't work any more.

OUR CONTRIBUTORS: Sebastian Rupley is a senior editor and John Clyman is a contributing editor of PC Magazine. Cade Metz is a senior writer, Michael Kobrin is a staff editor, and Cisco Cheng is a lead analyst. Associate editor Sarah Pike and lead analyst Neil J. Rubenking were in charge of this story.



X1 Search gives you back the time you've lost – to searching for the data hiding in your PC, to watching animated icons (while Windows® or your email application can't find content you need... right away), to recreating files you couldn't find. The time when the deadline's too close. Or when you have to stay late to find that critical message, presentation, or spreadsheet ...from six years ago.

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OUTLOOK EXPRESS

These days, your in-box is a dangerous place to visit. One oh-so-sincere message may persuade you to launch an unsafe attachment. Another may steal personal information the moment you preview it. Since Outlook Express comes free with the operating system, it's the e-mail client of choice for a large segment of the population. In SP2, Outlook Express offers significantly better protection against unsafe attachments and personal-information theft.

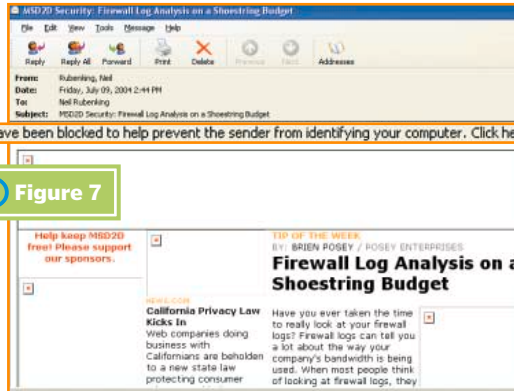
Some advertisers may tie information they've gathered about you on the Web to your e-mail address. (The information is available to them in the form of cookies, which typically contain no personal data, unless you've offered it to a Web site.) They do this by using an image, called a *Web bug*, in an HTML e-mail message. To display the HTML-based message, the e-mail client has to request the Web bug image from its host. A modification to the image's URL lets the host connect your surfing history and other data with your e-mail address. A simpler version verifies that your e-mail address is active and ripe for more spam.

To block Web bugs, the new OE prevents downloading pictures and other external HTML content by default (see **Figure 7**), just as Outlook 2003 does. A small info bar appears above the message text, reporting that pictures were blocked and offering the option to display them if you're sure the message is safe.

To restrict the possibility of falling prey to malicious HTML in e-mail, many users choose to view all their messages as plain text. But since prior versions of OE have the HTML-viewing control to view the text, it's theoretically possible that code could have executed. SP2's OE uses the Rich Text control instead, so this can't happen. Here again, if you're quite sure a message is safe, you can choose to view the full HTML-formatted text.

Microsoft planned to set up OE so that all attachments would automatically execute with minimal permissions, preventing malicious ones from doing harm. The company axed this feature, because it broke too many corporate solutions that require executing attachments from internal e-mail.

The new Attachment Manager service, however, has significant power to ban



execution of unsafe attachments. It actually modifies the downloaded file, marking it using a secondary data stream (a feature available only in NTFS, the preferred file system for Windows XP). Copy the file and the mark remains. Files inside a ZIP archive attachment will be marked when extracted by a ZIP utility redesigned to work with Attachment Manager. Thus, the old trick of renaming an EXE file to TXT for e-mail transmission no longer works.

A determined user could open the file's properties and click on Unblock—unless the administrator has disabled this feature—but the only sure way we know to run an attachment that OE deems unsafe is to copy it onto a non-NTFS drive.

RECOMMENDATIONS

While SP2 won't make us impervious to attacks, it's a big step forward in many areas and should be considered a must-have update. SP2 provides more efficient patching, a stronger and easier firewall, a pop-up blocker, and several other improvements, including many under the hood.

Unfortunately, all this protection doesn't come small. Depending on how up to date your patches are, the SP2 download will probably be between 100MB and 300MB. That's definitely too big for dial-up users. And it's enough to make a lot of people stick with the status quo, which is a bad, bad thing. Consumers should be able to order a CD, however, around the same time SP2 becomes available for download via Windows Update.

SP2+Tablet PC=Lonestar

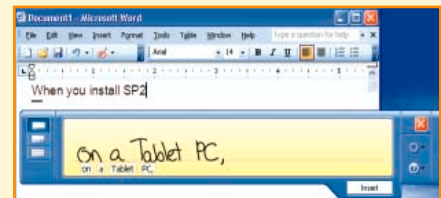
When you install SP2 on a Tablet PC, you get Lonestar, the code name for a set of Tablet PC-specific enhancements, such as improved handwriting recognition, URL entry, and context detection.

Rather than making users enter text at the bottom of the screen, the new Tablet Input Panel (TIP) lets them simply tap or hover over a document and write in context; the input panel pops open beneath the stylus. Users write directly in the box, which then attempts to recognize each written word before inserting it into the document.

Entering Web addresses has also been made easier with custom quick keys for inserting things like *www.* and *.com*, and recognizing common sites like Hotmail and Google. And the OS's writing pad does a much better job of recognizing handwriting with the *Add to Dictionary* quick key. You train the TIP to recognize your vocabulary rather than individual letters.

The TIP function and improved handwriting recognition will work optimally with Office 2003. For example, you can send handwritten e-mails using Outlook 2003 or just add ink annotations to normal text messages. As far as browsers are concerned, your best bet may be to stick with Internet Explorer; in testing, using SP2, release candidate 2, the TIP worked erratically with Netscape 7.1 and not at all with Opera 7.51.

Developer tools round out the enhancements. With Lonestar's additional support for context sensitivity, developers can tag for context in specific fields (using SDK 1.7) in solutions that are based on customized forms. Although not part of SP2, the additional download of Windows XP Tablet PC Edition Platform SDK 1.7 will give developers more control with ink-aware applications and speech recognition tools.—Cisco Cheng



THE TABLET INPUT PANEL (TIP) provides a much more intuitive way to enter handwritten text into applications.

Code Name: Longhorn

By John Clyman

Longhorn is Microsoft's most ambitious operating-system development effort in a decade or more, entailing both an extensive redesign and a major overhaul of the application programming interface (API), the underlying set of services the OS provides to programs. Despite the significant changes, though, Longhorn is far from a complete rewrite; it builds on the Windows XP and Windows Server 2003 code bases as well as the .NET framework—Microsoft says main-

about the direction Microsoft is taking with its new OS. We find the new 3D user interface (see **Figure 8**) useful and fun. We're optimistic about the prospects the WinFS file system, an ambitious and appealing effort to better organize, categorize, and expose the masses of material on modern hard drives. (And we hope Microsoft has learned from its missteps with the object file system in Cairo and its other efforts to recast the file system.) We expect that developers will appreciate the steps Microsoft is taking to simplify the Windows programming

model and to make it easier to write graphically rich applications. Perhaps most of all, weary of combating exploits and applying hotfixes, we're looking forward to the increased security and reliability that Longhorn aims to offer from day one.

Microsoft is writing much of Longhorn in "managed code" atop the company's .NET framework, which for the first time will ship as a standard part of the OS. Most of .NET's benefits are oriented to developers, but by giving developers better tools, Microsoft hopes that the OS and the applications that run on top of it will see similar improvements.

Managed code automatically handles tasks such as memory allocation and boundary checking, so it isn't susceptible to classes of bugs like the infamous buffer overrun. Those kinds of bugs can lead to stability and security problems like the RPC interface buffer overrun exploited by the Blaster worm or the LSASS buffer overrun exploited by Sasser.

The .NET framework also gives developers more robust ways to package their applications, which helps avoid the "DLL hell" that can occur when different programs rely on different versions of shared libraries. As managed code becomes more pervasive, users won't need to reboot as frequently after installing software and drivers—a major relief.

Microsoft is improving Longhorn's network-sensing and autoconfiguration features. And the OS now supports *castles*,



Figure 8

taining compatibility with existing applications is a priority.

As evidence of this commitment, last year's Professional Developers' Conference—Microsoft's annual confab for third-party Windows developers—included a demonstration of Longhorn running VisiCalc, the classic DOS-based spreadsheet application from 1981.

Longhorn's goals are numerous: Make Windows more productive and engaging, improve security and reliability, and provide support for a new generation of rich, media-aware applications. That's just to name a few. To get a taste of what Longhorn has to offer, we installed and worked with build 4074, which was released at Microsoft's Windows Hardware Engineering Conference this spring. We also quizzed Microsoft developers to get the inside track on what's still to come.

While it's too early to pass judgment on Longhorn, which we don't expect to ship until 2006 or 2007, we're hopeful

about the direction Microsoft is taking with its new OS. We find the new 3D user interface (see **Figure 8**) useful and fun. We're optimistic about the prospects the WinFS file system, an ambitious and appealing effort to better organize, categorize, and expose the masses of material on modern hard drives. (And we hope Microsoft has learned from its missteps with the object file system in Cairo and its other efforts to recast the file system.) We expect that developers will appreciate the steps Microsoft is taking to simplify the Windows programming

LONGHORN BASICS

Longhorn will come in multiple versions, including desktop and server versions, a 64-bit version, and versions akin to today's Windows XP Media Center Edition and Tablet PC Edition. Although they'll be adapted for specific environments, each version will be based on the same foundation; Microsoft plans to avoid dividing its OS development efforts as it did in the era of Windows 95 and Windows NT.

Longhorn installation and maintenance are designed to be smoother than in

LONGHORN ARCHITECTURE

WinFX
A new Windows API based on .NET framework 3.0.

PRESENTATION **Avalon**

A vector-based unified graphics system with media support, document flow, and a markup-based programming model.

DATA **WinFS**

A database-driven file system with support for metadata, relationships, transactions, and strong typing.

COMMUNICATION **Indigo**

A Web services infrastructure for building distributed applications.

BASIC OPERATING SYSTEM SERVICES

Fundamentals

Includes kernel, security, configuration, hardware abstraction layer, deployment, and other basic capabilities.

which let you better manage multiple systems on a small network, without needing heavy-duty infrastructure. The company also aims to improve support for mobile devices, with goals like instant resume in notebooks and built-in support for synchronization with PDAs and other portable computing products.

Security is definitely a priority in Longhorn. Many of the security-oriented features in Windows XP Service Pack 2, such

solve a real problem. The company claims its most common support question comes from inexperienced users who open an application and obscure one that's already open, leaving them to wonder where the first app went. Transparent borders make the notion of stacked windows more explicit. Or it might be that Microsoft is just trying to play catch-up with Apple in the interface department.

Even for those whose hardware doesn't support the full Aero Glass experience, Longhorn's UI will aim to make common computing tasks easier. Support for media, such as

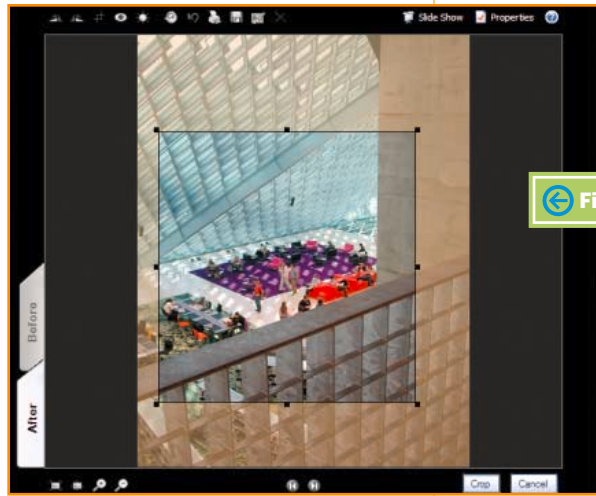


Figure 9

music files and digital photographs, is integrated cleanly into the shell; it's easy to create slide shows or jump into the simple, built-in image editor (see Figure 9) to crop a picture, adjust contrast, and remove red eye.

File browsing will also improve, giving you more ways to find and organize your data. We particularly like the Wordwheel search box, which lets you key in a few characters and instantly narrow the list of files (see Figure 10). Longhorn also contains integrated support for common data types, like contacts and organizations, and lets you manage them—and relationships between them—directly from the shell.

The shell has some goodies in store for power users and developers too, includ-

as the new Windows Firewall, will be included. Additionally, Longhorn will provide an entirely new high-security environment known as NGSCB (Next-Generation Secure Computing Base).

In conjunction with new PCs that contain the requisite hardware support, NGSCB provides capabilities like strong process isolation and “sealed storage.” They can better protect sensitive information from other programs, such as spyware, that might try to access it for illegitimate purposes. Microsoft has also announced its intention to begin supplying antivirus features, but it hasn't yet disclosed details.

A NEW LOOK

Longhorn's new user interface is called Aero. Ultimately it will be available in two tiers, standard Aero and Aero Glass. Aero Glass will require a high-end DirectX 9-compliant 3D graphics processor with AGP 8X or PCI Express support and at least 64MB of RAM (with more recommended). Longhorn will also provide a classic, Windows 2000-style interface as a fallback.

Aero Glass will take advantage of high-end graphics capabilities by employing 3D effects, animations, and transparency. Though we might intimate that visual frills like semitransparent borders on windows are eye candy, Microsoft says they can

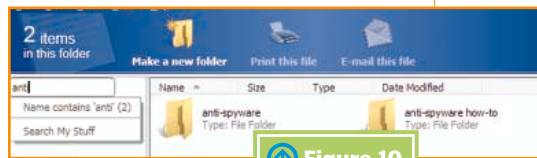


Figure 10

ing a dramatically enhanced task scheduler, a new UI automation framework, and a command line interpreter (code-named Monad). Just as DOS allows users to write batch file routines from a command line, Monad supports pipelining of object-oriented *cmdlets*, which are scripts that make it easy to do things like share .NET objects between applications or send queries to more than one application at once.

Microsoft is mostly mum about Monad at this point, but there is some information about it on the developer Web site

for Longhorn: msdn.microsoft.com/Longhorn/. The site is one of the very best sources for keeping track of what will and won't make it into the OS.

UNDER THE HOOD

Underlying all the visible features is a new API called WinFX (which Microsoft claims doesn't stand for anything in particular). WinFX comprises three major subsystems: Avalon (presentation), WinFS (data storage), and Indigo (communication).

Avalon is the unified graphics API that makes Aero possible. It ties together the disparate display APIs that exist in Windows today—DirectX, GDI+, Windows Forms, and so on. Its goal is twofold: to simplify the development of applications that can seamlessly combine capabilities such as dialogs and animations, and to reduce CPU context switching, eliminating the performance bottlenecks that can cause artifacts during video playback.

Graphics are vector-based rather than bitmapped in Avalon, a profound change making scaling and visual effects much easier to implement. It also means that your fonts and icons won't shrink if you move from a standard 96-dpi LCD monitor to a higher-resolution model; instead, they can be rendered at the same physical size while taking advantage of the increased resolution. Avalon also changes the way applications interact with the display. Individual programs write to a private canvas, and a Desktop Compositing Engine then determines how to manipulate, apply effects to, and overlay individual application windows.

Furthermore, Avalon allows *declarative* programming, using an XML-based markup language called XAML (Extensible Application Markup Language). XAML, which is much like a turbocharged form of HTML, gives designers an easy way to build sophisticated user

interfaces while leaving core development tasks to developers. These capabilities include support for 3D with built-in lighting and texturing effects and “hit testing”—that is, figuring out what the user clicked on in a complex 3D environment. Developers do still have access to the traditional imperative model, as well as to the existing WinForms and Win32 GDI+ APIs.

Longhorn's data storage subsystem, WinFS, is similarly ambitious. It combines the established NT File System (NTFS) with a database engine based on the same code as the next version of Microsoft SQL



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Server, code-named Yukon. In WinFS, what we traditionally think of as files become items that can be associated with a variety of metadata; digital photos, for example, might have attributes for the camera type, exposure details, and even the location of the photograph, once GPS-enabled cameras become commonplace.

WinFS incorporates “primitives” for a variety of other common data types such as contacts, events, and e-mail messages. Because WinFS is built on a relational database, these items can be related to each other in complex ways; e-mail can be related to contacts, which are part of organizations, and so on.

WinFS’s relational store offers full database-style transactional capabilities, allowing developers to require that either all of a group of related updates take place or that none do, to preserve data integrity. This feature also means that developers

who currently rely on embedding a custom database engine (or having users install a lightweight SQL server, such as MSDE) will eventually be able to count on these DBMS capabilities being a fundamental part of the platform, once Longhorn’s installed base is sufficient.

The third pillar, Indigo, is Microsoft’s effort to lay the foundation for a service-oriented architecture (SOA) in the Windows platform—and thus give developers much better tools for building applications that rely on distributed resources. (For more on SOA, turn to “A Better Blueprint for Business,” on page 131.) The notion behind an SOA is that applications can be composed of loosely coupled components that ask other components to perform tasks. Those other components may be local or remote, and may be written by the same vendor or a different one.

To some extent, Indigo’s goals mirror those of distributed object systems like DCOM (Distributed Component Object Model) or CORBA (Common Object Request Broker Architecture), but with looser coupling and more explicit attempts to address the challenges that face Internet-connected systems—such as coping with

long latencies, managing security, and supporting asynchronous requests.

Indigo is built on a Web services model, and Microsoft is working with BEA, IBM, Sun, and other vendors to ensure interoperability. Developers can also look forward to a new display driver model, a new printing architecture, and features such as location services, which make it easier to build applications whose behaviors change depending on a user’s location, as well as more that we don’t have room to catalog here.

THE TIME LINE—AND THE BOTTOM LINE

Currently, Microsoft is releasing Longhorn primarily to developers so they can begin adapting applications to its features. The first large-scale beta release of Longhorn is expected in 2005. Experience tells us multiple betas are likely, and while Microsoft has not committed to a release date publicly, we estimate it will be 2006 or 2007 before the Longhorn code goes gold.

We like a lot of what Longhorn promises: Better security and reliability and an improved API for developers are key factors. The question for the next few years is how well Microsoft can deliver on these promises. You can be sure we’ll keep you posted along the way.

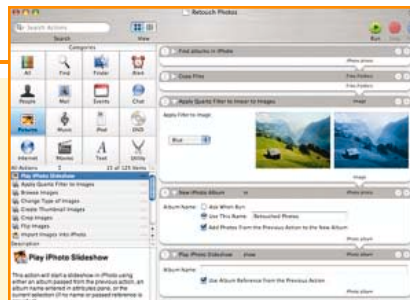
The Mac OS & Linux Future

Windows dominates the OS jungle, but it will never command the fervent devotion other systems, such as Linux and Mac, enjoy. Apple’s next OS X release—10.4, code-named Tiger—will be available early next year. Linux’s current kernel, 2.6, will stay in distribution for some time; 2.7 and 2.8 are being developed now. So, what’s in the works for these cult favorites?

Apple has applied features from one of its biggest hits, iTunes, to the rest of the OS. While Windows users will have to wait until Longhorn is released for improved searching, Tiger’s updated Finder will let you search by keyword, file type, relative time period, or other metadata and quickly call up a file or app via the new Spotlight search field.

Tiger will come with a new version of Apple’s Web browser with RSS support (called Safari RSS), an updated iChat AV, and a trainable repetitive-task utility called Automator. Another new app, Dashboard, will provide easy access to mini JavaScript applets—Widgets—some of which include a calendar, sticky notes, and a stock ticker.

The new OS will include a scalable graphics architecture, support for the new H.264/AVC (Advanced Video Coding) standard, and



Tiger’s new Automator performs repetitive tasks, such as retouching photos.

a new spoken interface called VoiceOver. Apple’s visual application development environment, Xcode 2.0, adds 64-bit support and continues the company’s efforts to increase the number of apps available for Mac OS X—an area in which it has notoriously lagged behind Windows.

Plans for Version 2.7 of the Linux kernel have yet to be finalized, but according to Open Source Development Labs (www.osdl.org),

home to Linux creator Linus Torvalds, it could offer improved support for 64-bit processors, SMP (symmetric multiprocessing), Wi-Fi, USB, and Voice over IP. Like all odd-numbered kernels, Version 2.7 will be an experimental release; production-level code won’t arrive until Version 2.8.

Such enhancements are a long way from showing up in commercial products; many distributors, including one of the best known, Red Hat, are still developing commercial products based on the Linux 2.6 kernel, first released in December 2003. 2.6 is more scalable than previous kernels, able to run on extremely small consumer electronics devices as well as large supercomputers. It’s also more suited to notebooks, since it can now handle ACPI power management better. And it supports popular desktop technologies like Hyper-Threading, USB 2.0, and Bluetooth. (In some cases, you can already find many of these in Linux releases based on the 2.4 kernel).—*Michael Kobrin and Cade Metz* ■

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BENQ DW830A

Double-Stuff DVDs

Dual-Layer DVD Recorders

DUAL-LAYER (DL) DVD recorders are finally here, but the DL format is still a work in progress. Media remain scarce and expensive, and the first generation of DL recorders and application software currently produces discs that many DVD set-top boxes and computer drives can't read. We expect most of these issues to be resolved before the end of the year, but if you buy a dual-layer recorder today, steel yourself for an early-adopter experience.

None of these caveats dampen our enthusiasm for this new format. Unlike single-layer discs, which hold 4.7 billion bytes (or 4.37GB) of data, dual-layer recordable media store a whopping 8.5 billion bytes (7.95GB), matching the capacity of the dual-layer DVD-Video discs used to distribute Hollywood movies.



MICRO SOLUTIONS BACKPACK DVD±R/RW

Dual-layer recording is still problematic, but the DVD industry has made significant progress toward solving compatibility problems and media shortages. In case you don't need to jump to DL right away, we also take a look at the latest 8X drives.

BY DON LABRIOLA

D

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- 106 Micro Solutions Backpack DVD±R/RW ●●●●●○
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Dual-layer recordable media store a whopping 8.5 billion bytes (7.95GB).

This last issue is especially important, because one of the biggest selling points for DVD rewriters has been their ability to back up movies, a task that usually requires two single-layer discs. Splitting a DVD-Video can disrupt its logic, preventing menus from locating assets, and even making some movies impossible to copy. We copied unprotected discs for our testing purposes; expect problems if you try copying protected ones.

DL recording is equally useful for authoring professionals who want to produce single-disc prototypes of dual-layer projects without being forced to recompress content. The format also nearly doubles the space for home video productions, system backups, and data-archiving applications, and may someday be used instead of DLT (Digital Linear Tape) to create dual-layer DVD masters for replication.

FORMAT FOLLIES, CONTINUED

As with most innovations in the DVD-recording industry, the DVD Forum and DVD+RW Alliance plan to promote their own proprietary dual-layer recording formats. Building on research at Philips and MKM (Mitsubishi Kagaku Media), the Alliance has already launched its write-once DVD+R DL specification. Even though the industry has long used “dual layer” to describe media that contains two recording layers per side, the Alliance has selected “double layer” to describe DVD+R DL.

A similar format developed concurrently at Pioneer Electronics promises to become the basis for the DVD Forum’s imminent (but as yet unnamed) dual-layer version of DVD-R. There are rumors of rewritable dual-layer formats, but no announcements are expected this year.

The Forum and Alliance offerings will

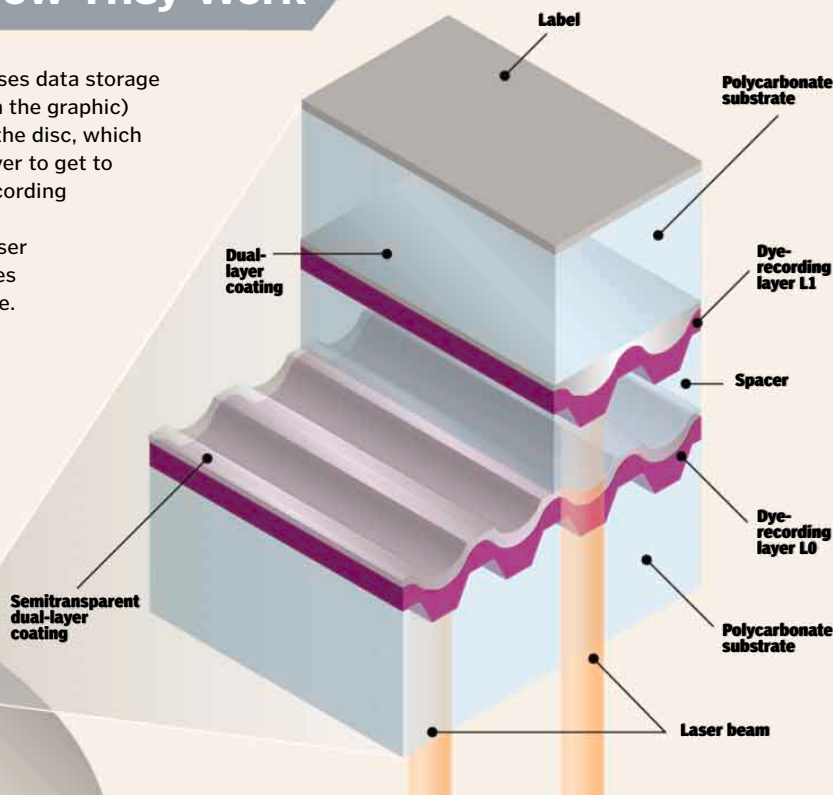
have many minor technical differences and will use different mechanisms for addressing and locating data on a disc. Once the two formats mature, neither is likely to be any more compatible with third-party players. Each specification will, however, permit data to be recorded only onto its corresponding proprietary media.

From an end-user perspective, the most obvious difference between the two will likely be write speed. DVD+R DL will initially support 2.4X recording, but the Forum’s dual-layer spec will probably run at 2X. 4X versions of both formats are already in development.

Blank DVD+R DL discs are only just starting to appear online, now selling for a little more than \$10 each. Prices should begin dropping quickly late this year, and both Alliance and Forum media should be readily available in stores for the holidays.

Dual-Layer DVDs: How They Work

The new dual-layer DVD+R media increases data storage capacity via an extra storage layer (L0 in the graphic) that’s accessible from the same side of the disc, which means you don’t have to turn the disc over to get to the data on the other side. Each data-recording layer consists of a thin organic dye film; recording takes place when a focused laser beam heats and thus irreversibly modifies the dye’s chemical and physical structure. This new format increases the data capacity of a disc from 4.37GB to 8.5GB while retaining compatibility with existing DVD-Video players and DVD-ROM drives.



HOW DUAL-LAYER DVDS WORK

To understand how dual-layer recording works, you first need to know how DVD players retrieve data from mass-produced single-layer discs. Read-only DVDs store information as billions of microscopic pits stamped in a spiral groove on the upper surface of a clear polycarbonate disc. The grooved side of the disc is coated with a reflective material such as aluminum, which is then bonded to a second plastic platter that is imprinted with a label.

When a laser positioned below the disc sweeps along the groove, an optical pickup in the drive monitors the amount of light bouncing off the reflective layer behind the pitted surface. Alterations in the beam that occur as it passes across a pit allow the drive to interpret the stamped pattern as a sequence of ones and zeros.

On a recordable DVD, a blank groove coated with heat-sensitive organic dye replaces the stamped pits. A virtual "pit" is recorded by heating a pinpoint of dye with a tightly focused laser. This permanently changes the dye's physical characteristics at that one point, giving it optical properties similar to those of a stamped pit.

Dual-layer discs simply add a second recordable layer behind the first. In this case, the metallic coating behind the layer that's closer to the laser (L0 in the graphic) is translucent, which allows the beam to pass through it when focused on the deeper layer (L1).

Manufacturing a dual-layer recordable disc may sound like a straightforward task, but ensuring that both dye layers had the same optical properties as stamped grooves was a monumental feat. Even with careful tweaking of such parameters as the precise depth and shape of the recorded "pits," the thickness and chemical composition of each dye layer, and the reflectivity of the metallic coatings, first-generation DL media is still subject to constraints. Both dual-layer specifications require that data on Layer 0 be recorded before the corresponding position on Layer 1 can be burned. And the current crop of DVD+R DL drives must record both layers in their entirety before finalizing a double-layer disc.

Don't expect perfect results from dual-layer devices right now, but they are getting better every week. Experts expect a more refined and stable product by the fourth quarter of this year. But if you want to purchase a DVD drive right now, a dual-layer drive is a smart buy. The price is right, and these drives will do just as much as the 8X drives.

8X External Hard Drive: Memorex True 8X Dual Format External DVD Recorder 8X Internal Hard Drive: Pioneer DVR-A07XL Dual Layer: BenQ DW830A



When buying a DVD drive, a common mistake is to consider speed but not need. As we looked at the nine different DVD recorders in this story, it quickly became apparent that no one drive suited all situations, so we broke them down into 3 categories: external, internal, and the new dual-layer format.

The Memorex True 8X Dual Format External DVD Recorder has a great software bundle, dual interfaces, and a reasonable price. These combine to make this relatively bulky external drive a terrific choice for anyone who needs a transportable DVD recorder that supports all the latest high-speed formats. The Pioneer DVR-A07XL is a solid performer across the board. It combines superior application software with a raft of unique hardware features that help ensure high-quality output. And although the dual-layer format isn't quite perfect yet, we found that the BenQ DW830A was the best of the bunch. It's fast, ships with a powerful software bundle, and sells at a price that's almost too good to be true.

LEADER OF THE PACK

The first dual-layer DVD recorder to hit the market was the Sony DRU-700A, which began shipping in May this year with a DL-compatible version of Nero, Ahead Software's digital-media suite. When we tested an early production unit, the double-layer discs it created would not work at all in single-layer set-top recorders and PC DVD rewriters, and they produced mixed results in DVD-ROM drives and console DVD players.

At the time, Sony speculated that these problems resulted from the inability of single-layer recorders and rewriters to recognize the specific media identifier codes burnt onto DVD+R DL media. Such problems could be solved only by upgrading the older drives' firmware.

It now appears that there's more to the story than that. Media recognition is certainly an issue, but it's evidently not the only one, and it may not be a problem at all for many drives. DL discs created by most models in this roundup worked just

as reliably in single-layer recorders as they did in read-only players.

We also unearthed content-dependent compatibility problems that were more a function of disc-burning software than drive hardware. Double-layer disc copies that were otherwise compatible with a particular playback device sometimes failed when we chose certain menu items or when the drive attempted to switch layers. In such cases, the logic and layout of the original DVD-Video title affected compatibility at least as much as our choice of recorder did.

The manufacturers and Alliance representatives we spoke with seemed keenly aware of these issues and assured us they were working to resolve them. Firmware upgrades and software patches were repeatedly released during our testing.

DL recording will undoubtedly revolutionize the DVD industry, but the format may take a few more months to stabilize. In the meantime, we present this snapshot of the emerging dual-layer market.



DUAL OR DOUBLE?

The DVD industry has always used the term *dual layer* to describe two-layer media, but this didn't stop the DVD+RW Alliance from unilaterally coining the term *double layer* to describe its DVD+R DL format. Because the DVD Forum plans to retain the traditional "dual layer" nomenclature for its own two-layer specification, the Alliance's strategy will probably have the desired effect: to differentiate its format from the Forum's offering. *Double layer* will by definition describe only DVD+R DL drives and media, and the more generic *dual layer* will continue to refer to read-only DVD-ROM and DVD-Video titles, the upcoming Forum specification, and all other two-layer formats.

Dual Layer

BenQ DW830A

Internal, dual-layer; 8X DVD+R speed, 2.4X DVD+R DL speed, 4X DVD+RW speed, 40X CD read speed, 24X CD-R speed, 10X CD-RW speed; ATAPI, \$129 list. BenQ America Corp., www.benq.com. ●●●●○



With the lowest price of all the products we review here, the BenQ DW830A is a terrific bargain and a solid performer. But like most of the double-layer drives we tested, our evaluation unit suffered from a few growing pains.

The DW830A ripped DVDs and recorded DVD+R media faster than any other dual-8X or double-layer drive we tested, and it produced competitive results on most other performance tests. It finished last on our double-layer recording tests, but its performance was only about 11 percent behind that of the first-place Sony DRU-700A.

The drive ships with an expansive multivendor software bundle that includes InterVideo's WinDVD Creator 2 authoring system, WinDVD 4 movie player, Sonic Solutions' RecordNow! 7.1 disc-mastering application, and DLA 4.90 drag-and-drop packet-writing software. Rounding out the package are several BenQ tools that include the company's QVideo 2.0 video-capture utility.

The DW830A also incorporates Write Right Technologies, which BenQ claims reduce recording errors. These features include a disc auto-centering mechanism and the ability to adjust laser power and tilt angle continuously, to compensate for problems such as warped media and inconsistencies in a disc's recording layer.

Most of the double-layer DVDs created by our evaluation unit worked flawlessly. But when we tried to burn an 8GB dual-layer disc image that had been generated by SmartRipper, a DVD-ripping utility, the resulting DVD+R DL disc worked in only one of our test players. Ironically, that same device was the only one that could play Video CDs created by the DW830A on our DivX/VCD performance test. In both cases, we suspect that the problem lay with the application software, not with the drives themselves.

The DW830A isn't perfect. It can't record DVD Forum "dash" media, and it

requires a \$50 upgrade to rip audio CDs to MP3 discs. But in most other ways, it's a top-notch product that is one of the best buys on the DVD recorder market today.

LaCie d2 DVD±RW Double Layer

External, dual-layer, dual-format, 8X DVD-R speed, 4X DVD-RW speed, 8X DVD+R speed, 2.4X DVD+R DL speed, 4X DVD+RW speed, 40X CD read speed, 32X CD-R speed, 16X CD-RW speed; USB 2.0, FireWire, \$199 list. LaCie, www.lacie.com. ●●●●○

One of the most affordable portable DVD rewriters we review here, LaCie's d2 DVD±RW Double Layer drive is also a ruggedly built unit that held its own on



(TOP) BENQ DW830A

(BOTTOM) LACIE D2 DVD±RW DOUBLE LAYER

most of our performance tests and produced the most reliable double-layer output in the roundup.

The d2 connects to your computer through a dual-bus interface that automatically detects whether you've plugged the drive into a USB 2.0 or a FireWire port. Its chassis is made of the same tough, lightweight zamac alloy used for die-cast metal toys. It is the smallest external drive in the roundup (1.7 by 6.3 by 10.6 inches, HWD) and weighs in at a

lighter-than-average 3.3 pounds. LaCie also offers several rack-mounting options, including a four-drive racking kit.

In addition to USB and FireWire cables, LaCie packages the d2 with multiple copies of Roxio's Easy Media Creator and Toast disc-creation applications, designed for various versions of the Windows and Mac operating systems. We ran our performance tests with the bundled Windows XP version of Easy Media Creator 7, which, unlike the standard retail product, doesn't offer DivX support or MP3 encoding, but manages to cover all the other bases.

Like the other external drives we tested, the d2 took about twice as long as most internal models to rip an unencrypted DVD-Video disc to our hard drive. But it held its own on our other performance tests, scoring better than average.

The d2 also beat out all other DVD+R DL models on our compatibility tests. With one exception, every DL disc it created worked perfectly in all of our test players. One DVD set-top box refused to recognize a disc that had been burned from our most complex SmartRipper-generated source material, but no other drive in the roundup did any better on this particularly challenging test.

The d2 DVD±RW Double Layer isn't the fastest model we tested, but it's a solid product with no major flaws. If you're looking for a portable DVD rewriter that you can count on to create dependable double-layer recordings, you'll have a hard time finding a better-built unit for the price.

Lite-On SOHW-832S

Internal, dual-layer, dual-format; 8X DVD-R speed, 4X DVD-RW speed, 8X DVD+R speed, 2.4X DVD+R DL speed, 4X DVD+RW speed, 40X CD read speed, 40X CD-R speed, 24X CD-RW speed; ATAPI, \$150 list. Lite-On Technology Corp., www.liteon.com. ●●●●○

The Lite-On SOHW-832S did as well on our testing as any of the DVD+R DL drives in the roundup. The drive exhibited some of the same compatibility problems as the other dual-layer recorders, but it also turned in some of the best performance numbers.

One reason for this could be its unique SMART-X technology, which continually adjusts the drive's rotational speed to provide optimal performance when playing or ripping audio CDs, Video CDs, and DVDs. Our evaluation unit produced outstanding CD-ripping and -recording figures, easily outpacing any other drive we tested. It also did well burning rewritable



OUR CONTRIBUTORS:

Don Labriola is a contributing editor of PC Magazine. Staff editor Daniel S. Evans was in charge of this story.

media, turning in the best DVD+RW time we measured, and falling only 4 seconds behind the first-place LaCie d2 in our DVD-RW test. On other performance tests, the SOHW-832S almost always produced at least average results.

The SOHW-832S ships with an abbreviated version of Ahead Software's Nero digital-media suite, which lacks several modules but includes key components, such as the InCD 4 packet-writing utility and the powerful Nero Vision Express 2 SE video editor. The package also provides full DivX support and 30 free MP3 encodes (an online upgrade adds unlimited MP3 ripping), and it supports Ahead's MPEG-4-based Nero Digital file format through the Nero Express disc-mastering module. A copy of CyberLink's PowerDVD utility handles DVD-Video playback chores.

The SOHW-832S ranked just below the BenQ DW830A on our compatibility tests. It produced Video CDs that worked in two of our three test players, and its baseline double-layer discs performed perfectly across the board. But the drive failed our more advanced DVD+R DL compatibility test, producing discs that none of our playback devices could recognize.

There's a lot to like about the SOHW-832S, and once the last few glitches are resolved, we'll have no problem giving it an



(TOP) LITE-ON SOHW-832S
(BOTTOM) SONY DRU-700A

enthusiastic thumbs-up. We do, however, advise potential buyers to take a look at the BenQ device—our dual-layer Editors' Choice—which also did well on our tests but costs much less.

Sony DRU-700A (follow-up review)

Internal, dual-layer, dual-format; 8X DVD-R speed, 4X DVD-RW speed, 8X DVD+R speed, 2.4X DVD+R DL speed, 4X DVD+RW speed, 40X CD read speed, 40X CD-R speed, 24X CD-RW speed; ATAPI (IDE), \$180 list. Sony Electronics Inc., www.sony.com/dvdburners. ●●●○○

It's been nearly two months since our initial peek at the Sony DRU-700A, which was then the only DVD+R DL rewriter on the market. Compatibility problems and a lack of DVD+R DL media didn't stop us from giving the drive a good review, but we decided to withhold final judgment until double-layer technology had more time to mature.

When we revisited the drive for this roundup, we found that much had changed, but not enough to alter our conclusions substantially. A new firmware revision has resolved an earlier problem that prevented the DRU-700A from burning single-layer 8X DVD+R Verbatim media at top speed, and the drive's DVD+R DL output now works in a greater range of test players. But some double-layer compatibility problems remain.

None of the DL discs produced by our evaluation unit were recognized by our Pioneer DVR-A05 DVD-R/-RW rewriter, and those that contained more challenging SmartRipper-generated content worked in only half of our test players. (As we went to press, Ahead Software announced a patch to resolve some of these issues.)

In most other ways, the upgraded DRU-

Up Next: 12X

If you're still trying to get used to the idea of double-layer recording and haven't even begun to think about 16X drives, the thought of 12X DVD+R recorders may boggle your mind. Not only are no vendors currently manufacturing 12X media, but the DVD+RW Alliance hasn't even released a formal 12X specification.

Nonetheless, this new format is real, and the first 12X drives should have already hit the shelves by the time you read this. Although there is no distinct 12X standard, last June's 16X DVD+R specification includes informal guidelines that describe in sufficient detail how to handle 12X recording. As for media, most 12X drives actually record 8X DVD+R discs at 12X. This is possible because higher-quality 8X media is often over-engineered enough to accommodate the higher rates.

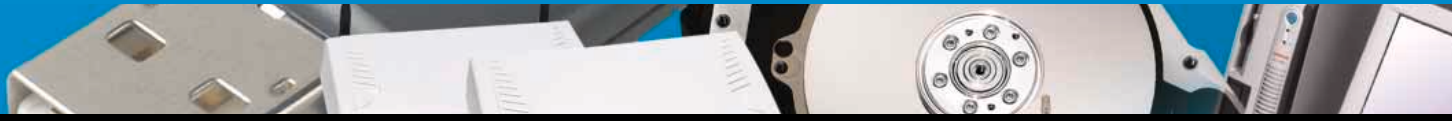
Other factors, such as the details of the disc's dye formulation, can also affect its 12X performance, so almost all 12X hardware producers guarantee performance only on certain brands of media (and sometimes specific lots) that they've certified. Some,

such as Plextor, even ship their drives with firmware or software tools that automatically query a disc to determine whether it's on the vendor's list of approved media.

Many drive manufacturers don't plan to release 12X recorders at all, preferring instead to leapfrog to 16X offerings a few months later. These vendors would rather not spend their time on a "short-lived" standard. But a decent selection of 12X models has been announced, the first of which began shipping just a hair too late to be included in this roundup. We've included baseline descriptions of a representative sampling in this table. Look for reviews on our Web site, www.pcmag.com.

Model	Features	Price	To find out more
LG GSA-4120B	Writes all DVD formats, including DVD-RAM and DVD+R DL	\$200 list	www.lgusa.com
Plextor PX-712 Spectrum Series	Includes parallel ATA, SATA, and dual FireWire/USB 2.0 models	\$209 list and up	www.plextor.com
Sony DRU-540A	Bundled with a nearly complete Nero suite	\$180 street	www.sony.com/dvdburners
TDK Internal 12X+/8X- Indi DVD Multiformat	Price leader for internal 12X drives; external version available for \$270	\$170 street	www.tdk.com

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<p>Starting At \$349 #4879825 HP d220 Microtower</p> <p>OFFICE</p> <p>hp dc7100 Desktop</p> <ul style="list-style-type: none"> • P4 520 • 2.8GHz • PCI Express • Serial ATA <p>\$899 #5234480</p> <p>Monitor sold separately.</p>	<p><i>Free Sprint PCS Card With ALL Notebooks!</i> \$180 Value</p> <p>Starting At \$799 #4765140 Compaq nx9008</p> <p>SONY VAIO PROFESSIONAL VAIO VGN-A130B1</p> <ul style="list-style-type: none"> • Centrino P-M 1.5GHz • 256MB PC2700 DDR SDRAM • 400MHz bus speed <p>\$1569 #5151836</p>	<p>Starting At \$299⁹⁵ #4897134 LG 15" L1515SK</p> <p>LG 15" L1515SK (Black)</p> <ul style="list-style-type: none"> • 1024 x 768 • Auto-adjustment function • Built-in power adapter <p>\$299.95 #4897134</p>
<p>HOME</p> <p>ThinkCentre A30</p> <ul style="list-style-type: none"> • 2.4GHz Celeron • 128MB PC2100 DDR SDRAM • Integrated 10/100 Ethernet controller <p>\$379.95 #4942126</p> <p>Monitor sold separately.</p>	<p>hp HP Compaq nx9010</p> <ul style="list-style-type: none"> • P4 2.8GHz • 15" display • 802.11g <p>\$1099 #5162068</p>	<p>PLANAR 19" PE191M (Black)</p> <ul style="list-style-type: none"> • Built-in speakers • 600:1 contrast ratio • Analog and digital <p>\$599 #4790935</p>
<p>DEAL</p> <p>acer AcerPower F1</p> <ul style="list-style-type: none"> • P4 2.6GHz • 128MB RAM • Windows XP Pro <p>\$459.95** #4822749</p> <p>Monitor sold separately.</p>	<p>TOSHIBA <i>Free USB Hub!</i> Tecra M2V-S310</p> <ul style="list-style-type: none"> • Centrino P-M 1.5GHz • CD-RW/DVD Drive • Windows XP Pro <p>\$1399 #5211448</p>	<p>BENQ 17" FP731 (Black)</p> <ul style="list-style-type: none"> • Just 6" Deep • 450:1 Contrast Ratio • One-Touch Calibration <p>\$399 #460436</p>

HANDHELD	CAMCORDERS
<p>palmOne Palm Zire 31 \$149 #4943225</p> <p>SONY Clie Tj37 w/free Pocket Quicken \$299 #4881431</p> <p>hp iPAQ 4350 w/free Pocket Quicken \$449 #4881634</p> <p>SHARP Zaurus SL-6000 \$699 #4879737</p>	<p>Panasonic SV-AV50 D-Snap \$359.95 #4935701</p> <p>Panasonic VDR-M50 DVD \$795 #4936674</p> <p>Canon Elura 60 MiniDV \$599 #4859269</p> <p>SONY DCR-PC330 MiniDV \$1395 #462783</p>
POWER PROTECTION	SOFTWARE
<p>APC Legendary Reliability SurgeArrest Personal \$7.95 #451367</p> <p>APC Legendary Reliability Back-UPS ES 500VA USB \$53.95 #435611</p> <p>TRIPP-LITE Internet Office 750VA USB UPS \$64.95 #5087416</p> <p>TRIPP-LITE SmartPro UPS 1500VA \$339.95 #5087424</p>	<p>Macromedia Contribute 3.0 \$69.95** #4801876</p> <p>symantec. Norton AntiSpam 2004 \$26.95*** #456694</p> <p>Intuit Quicken Deluxe 2005 CALL #5156717</p> <p>ScanSoft Produced by PDF Converter Pro 2.0 \$89.95 #5104618</p>

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700A is similar to the unit we first reviewed. It led the pack in MPEG encoding and CD-R, DVD+R, and DVD+R DL recording speeds, but turned in less impressive results when burning DVD-R or DVD-RW media. And it was abysmally slow when ripping an audio CD to MP3 files.

The DRU-700A includes a version of the Nero digital-media suite, which can be upgraded at no cost to add nearly all the capabilities of the full Nero 6.3 retail version. (The only omissions are 5.1-channel Dolby Digital playback and unlimited MP3 ripping, both of which cost extra.)

The DRU-700A is no longer a one-of-a-kind offering, but it's still a fine product. Although it may be the most expensive internal double-layer drive in the roundup, many buyers will find that its outstanding software bundle and performance justify its price.

PERFORMANCE TESTS

How We Test DVDs



Our test-bed was configured with Windows XP Professional, an ABIT IC7-G motherboard equipped with an Intel 875P (Canterwood) chipset, 1GB of 434-MHz Kingston HyperX PC3500 DDR SDRAM, and a Hyper-Threaded 3.2-GHz Intel P4 processor; a 7,200-rpm 100GB Western Digital Caviar hard drive;

and a Leadtek WinFast A250 GeForce4 Ti4600 graphics board. We tested each drive using only its bundled software and assigned an N/A to any test those applications could not complete. In all cases, we used Verbatim DVD and CD media.

Test One: Ripping a DVD-Video disc

We measured the time it took to rip a DVD-Video disc to a standard VIDEO_TS DVD folder on our hard drive. If the bundled software couldn't create a VIDEO_TS folder, we ripped to a disc-image file on the hard drive. Our source disc was DVD International's "Naxos Musical Journey: Saint-Saëns & Bizet," which fills over 98% of a 4.7GB platter with high bit-rate content. This title is not copy-protected and was used with the permission of the author and copyright owner.

Test Two: Burning single-layer recordable DVD media

We measured the time to copy a DVD-Video disc from the previously created DVD folder or image file to the fastest +R and -R media supported by the drive. We used a full 4.38GB (4.7 billion-byte) test image.

Test Three: Burning double-layer recordable DVD media

If the drive supported dual-layer recording, we measured the time to burn a 7.75GB (8.3 billion byte) VIDEO_TS folder to the fastest dual-layer recordable disc formats supported by the drive. Our baseline, dual-layer source image was ripped with the content owner's permission from the unprotected disc "Planet Earth: North America," produced by AlphaDVD.

Test Four: Burning rewritable DVD media

We used the drive's bundled packet-writing application to drag two 1GB files from the hard drive (using Windows Explorer, if necessary) to the fastest DVD-RAM, +RW, and -RW media that the drive supported. We began timing when we dropped the files onto the drive's disc icon and ended when the files were completely written and the disc was finalized and ejected.

Test Five: MPEG encoding/transcoding speed

We recorded the time to create a VCD disc-image from a 30-minute DivX AVI video file. In addition to measuring the performance of the drive's bundled MPEG encoder, this test verifies that the drive's bundled software can transcode DivX content to VCD-compatible MPEG-1 format without loss of audio sync or significant video degradation. If the bundled software did not support DivX, we instead created a VCD image from otherwise identical MPEG-1 source material. In this case, the drive received an N/A for Test Five, and the resulting image was used as input for Test Six.

Test Six: Burning CD-R media

We recorded the time to burn the previously created image to a Video CD, using the highest-speed CD-R media supported.

Test Seven: Ripping an audio CD to MP3 files

We recorded the time to rip a 65:17 audio CD to a set of 14 128-Kbps 16-bit MP3 files on our hard drive. If the drive's bundled software did not include an MP3 encoder, it received an N/A.

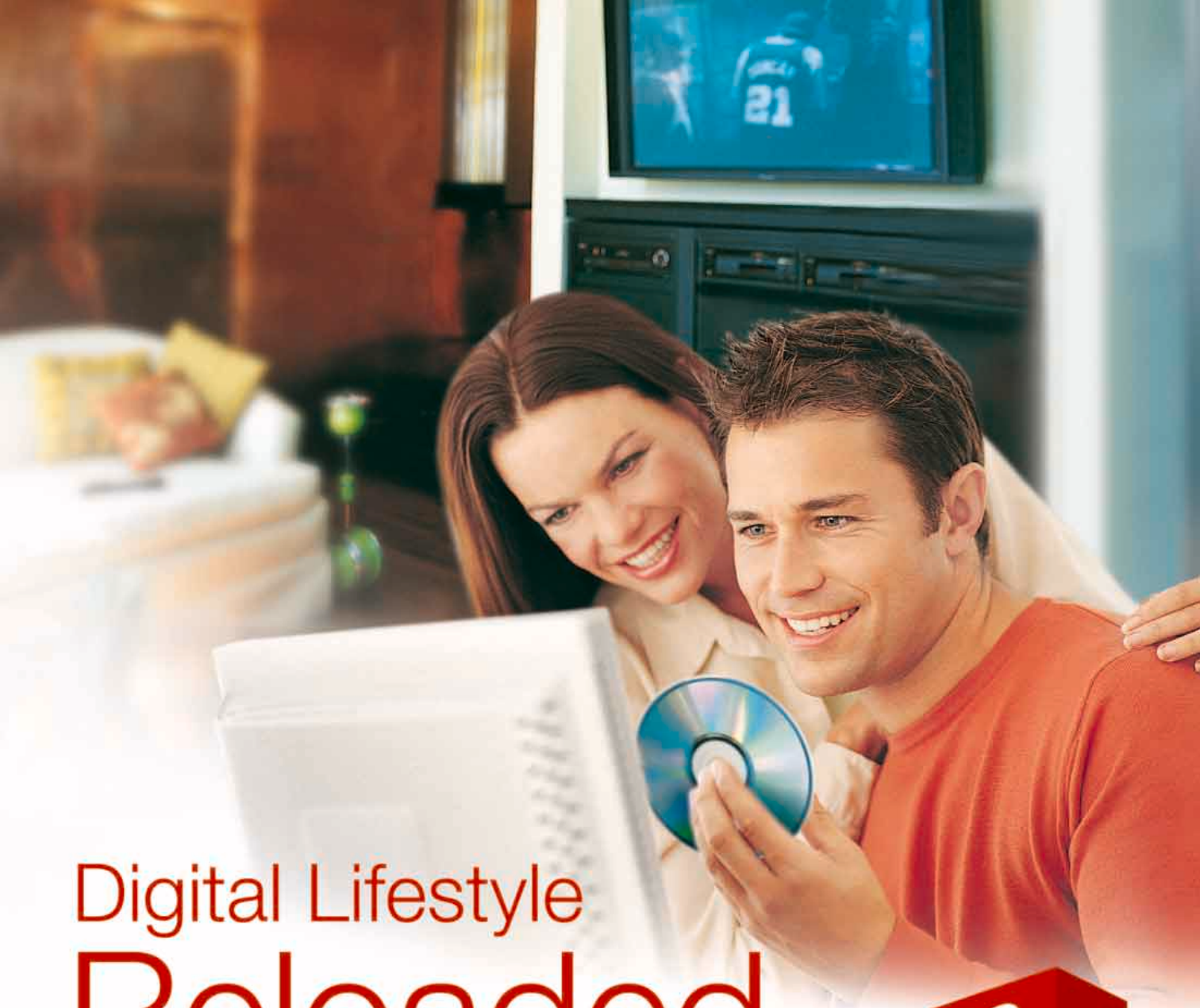
Test Eight: Compatibility

We tested the integrity of the video discs created in Tests Two, Three, and Six by attempting to play them in a variety of DVD drives. If the drive being tested could record dual-layer media, we also performed an advanced compatibility test on an additional dual-layer disc, which we burned using the drive's bundled software. The source material used to create this disc was a DVD-Video folder ripped from a particularly complex dual-layer DVD-Video title using the freeware SmartRipper utility.

All times are in minutes:seconds.
Low scores are best.
Bold type denotes first place.

	Rip DVD-V	Burn -R / +R	Burn +R DL	Write -RW / +RW	Create VCD image	Burn VCD	Rip CD to MP3
DUAL-LAYER DRIVES							
BenQ DW830A	6:40	N/A / 8:37	44:44	N/A / 7:07	20:54	2:56	N/A
LaCie d2 DVD±RW Double Layer	15:45	9:29 / 9:35	41:43	6:54 / 7:02	N/A	2:01	N/A
Lite-On SOHW-832S	7:54	9:46 / 9:12	44:19	6:58 / 6:55	20:05	1:47	2:58
Sony DRU-700A (with new firmware)	7:43	10:50 / 9:03	40:12	7:54 / 7:09	19:31	1:47	8:40
8X DRIVES							
LG GSA-4082B Triple Format Super-Multi Drive*	6:53	11:03 / 10:39	N/A	7:17 / 8:49	N/A	3:09	3:39
Memorex True 8X Dual Format External DVD Recorder	15:45	9:26 / 9:28	N/A	7:35 / 7:31	27:16	2:45	3:04
Micro Solutions Backpack DVD±R/RW	19:32	9:27 / 9:21	N/A	N/A / N/A	N/A	3:02	N/A
Pioneer DVR-A07XL	6:58	9:06 / 9:03	N/A	7:29 / 7:16	N/A	2:51	N/A
Toshiba SD-R5272	6:46	10:00 / 9:42	N/A	7:54 / 7:05	23:20	3:01	6:42

RED denotes Editors' Choice. N/A—Not applicable: The product does not have this feature. * This was the only drive capable of writing to DVD-RAM; it clocked in with a time of 20:43.



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* Does not copy DVDs with copy protections.

8X Drives

LG GSA-4082B Triple Format Super-Multi Drive

Internal; 8X DVD-R speed, 4X DVD-RW speed, 8X DVD+R speed, 4X DVD+RW speed, 3X DVD-RAM speed, 32X CD read speed, 24X CD-R speed, 16X CD-RW speed; ATAPI, \$200 list. LG Electronics, www.lgeus.com. ●●●○○

The LG GSA-4082B Triple Format Super-Multi Drive is aptly named: As the only five-format single-layer drive in the roundup, it takes ordinary multifunction capabilities a step further. In addition to the 8X DVD±R and 4X DVD±RW formats supported by most of the other models we tested, the GSA-4082B can read, write, and rewrite 3X DVD-RAM media. Although most people buy DVD rewriters to record video content, DVD-RAM's hardware defect-management features and ability to store almost 9GB of data on a single two-sided disc make it an attractive alternative for many smaller backup and archiving applications.

The drive ships with copies of CyberLink's PowerProducer 2 Gold disc-authoring system and PowerDVD 5 video player, as well as B.H.A.'s B's Recorder audio/data disc-burning application and B's CLiP packet-writing software for DVD±RW media. Also included is a remarkably stable drag-and-drop DVD-RAM driver.

The software is easy to use, but it lacks several important features. The system-backup module in B's Recorder has no disc-spanning, encryption, scheduling, or network-backup capabilities, and the program's disc-copying utility can't compress dual-layer discs onto a single piece of media. PowerProducer has only limited video-editing functionality: It even lacks the ability to add transition effects and text titles to movie clips. Worse, launching the program repeatedly muted the output of our test-bed's Creative Sound Blaster Audigy 2 ZS sound board.

The GSA-4082B's performance on our tests was uneven. It wrote 2GB of data to a DVD-RAM disc and confirmed the results in 20:43—a respectable figure for the relatively slow DVD-RAM format—and ranked first and second among single layer drivers on our DVD-RW packet-writing and DVD-ripping tests. But it finished last when recording DVD-R, DVD+R, DVD+RW, and CD-R media. Also, the bundled software's lack of DivX support rendered the device incapable of completing our VCD-creation test.

The GSA-4082B isn't the speediest or



(TOP) LG GSA-4082B TRIPLE FORMAT SUPER-MULTI DRIVE

(BOTTOM) MEMOREX TRUE 8X DUAL FORMAT EXTERNAL DVD RECORDER

most flexible 8X drive we tested. But even if it's not our first choice for DVD-Video applications, it is worth considering if you're looking for an inexpensive way to store data on DVD-RAM.

Memorex True 8X Dual Format External DVD Recorder

External; 8X DVD-R speed, 4X DVD-RW speed, 8X DVD+R speed, 4X DVD+RW speed, 40X CD read speed, 32X CD-R speed, 16X CD-RW speed; USB 2.0, FireWire; headphone jack, volume, R/L audio out, power controls, \$230 street. Memorex Products Inc., www.memorex.com. ●●●●○



The Memorex True 8X Dual Format External DVD Recorder offers an excellent combination of performance, functionality, and value. Not only does this reasonably priced drive provide both USB 2.0 and FireWire interfaces, but it also includes the most versatile and comprehensive software bundle in our roundup.

One of the greatest strengths of the True 8X drive is Ahead Software's Nero 6 software bundle, which has many of the features of the current 6.3 retail version of this popular digital-media suite. It includes the powerful Nero Express, but lacks Nero's Wave Editor, NeroMIX, and SoundTrax audio applications. And it re-

quires upgrades to obtain unlimited MP3 encoding and 5.1-channel Dolby Digital playback. But the True 8X does support Ahead's pioneering Nero Digital MPEG-4 format (unlike the Nero-equipped Toshiba SD-R5272), as well as a huge selection of audio and data disc-creation, slide show, DVD-authoring, and data-backup features.

Memorex complements the Nero bundle with a copy of Ahead's easy-to-use NeroPhotoShow Deluxe digital-photo manager, which lets you organize images into albums, edit them with a variety of one-click tools, and use them in slide shows, e-mail messages, screensavers, and wallpaper and on Web sites and video CDs. The company also throws in a pair of USB and FireWire cables—a nice touch at this price—and a full set of printed manuals. The drive also has individual right and left line-out audio jacks.

Our evaluation unit turned in middle-of-the-road results on our recordable and rewriteable DVD-burning performance tests. By contrast, it scored first among 8X drives on our CD-burning and -ripping tests, and it was one of only two single-layer drives we tested with the DivX playback and MP3-encoding capabilities necessary to complete our entire test suite. It did poorly on our DVD-ripping tests, however, taking more than twice as long as most of the competition to copy a 4.3GB unprotected DVD-Video disc to a hard drive folder.

Factor in that it's the lowest-priced external 8X drive currently available and you can easily see why we awarded the Memorex True 8X Dual Format External DVD Recorder our Editors' Choice.

Micro Solutions Backpack DVD±R/RW

External; 8X DVD-R speed, 2X DVD-RW speed, 8X DVD+R speed, 4X DVD+RW speed, 40X CD read speed, 32X CD-R speed, 16X CD-RW speed; USB 2.0; headphone jack, volume, line-out controls, \$249 list. Micro Solutions Inc., www.micro-solutions.com. ●●●○○

The latest entry in a long line of portable DVD rewriters, the Micro Solutions Backpack DVD±R/RW is 30 percent smaller and 40 percent lighter than the Memorex. In most other ways, though, it's no match for the faster, cheaper, and more flexible Memorex offering.

Chief among the Backpack's shortcomings is an underwhelming software bundle that includes Sonic Solutions' MyDVD 4.5, an older version of this disc-production application. The program lacks the many video-editing, titling, and effects capabili-

**imation****imation****DVD+R**

:: DVD-R

:: DVD+R

:: DVD-RW

:: DVD+RW

:: DVD-RAM

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ties that were added to MyDVD 5 last year.

The Backpack also includes Micro Solutions' SpeedyCD premastering software, which lets you burn audio, data, and mixed-content CDs and DVDs and perform one-click disc-to-disc copying. Although capable of creating the most common types of disc formats, SpeedyCD can't compete with the enormous feature sets and streamlined interfaces of more mature programs like Nero Express.

The Backpack burns DVD+RW media at 4X speeds, but it's the only 8X drive in the roundup that doesn't support the DVD Forum's new 4X DVD-RW specification. It can rip audio CDs to WAV files, but its software doesn't supply the encoder needed to record MP3 files. The drive's lack of DivX support and packet-writing software prevented it from completing our DVD±RW and VCD-creation performance tests. And unlike the Memorex drive, the Backpack has neither a FireWire interface nor a power switch.

To its credit, the evaluation unit turned in competitive results on our DVD-R and CD-R recording tests, and it actually bested the Memorex drive by 7 seconds on our DVD+R measurement. But it was solidly in last place on our DVD-ripping performance test, requiring 19:32 to rip an unencrypted 4.3GB DVD-Video disc to our hard drive.

Though it performed poorly, the Backpack is a rugged 8X drive that can handle many applications with aplomb. The biggest problem is that less expensive models can do an even better job.

Pioneer DVR-A07XL

Internal; 8X DVD-R speed, 4X DVD-RW speed, 8X DVD+R speed, 4X DVD+RW speed, 40X CD read speed, 24X CD-R speed, 24X CD-RW speed; ATAPI, \$190 street. Pioneer North America Inc., www.pioneerelectronics.com. ●●●●○



The Pioneer DVR-A07XL combines excellent performance and sophisticated hardware with a top-notch software bundle. We'd rather not have to download additional codecs or upgrade the software bundle for full functionality, but anyone who can live with limited MP3 and DivX support will have a hard time finding a better performer.

MORE ON THE WEB

Log on to PC Magazine's home page at www.pcmag.com for more reviews, news, and opinions.

The DVR-A07XL is essentially a revised version of Pioneer's DVR-A07U drive, upgraded with an attractive faceplate and multiple firmware tweaks.

The DVR-A07XL ships with Ulead's DVD MovieFactory 3 suite and VideoStudio 7 video editor, which together provide a powerful, integrated toolset for creating Video CDs, Super Video CDs, and DVD-Video discs. Other modules in the Ulead bundle let you assemble photos into slide shows, perform system backups, create audio and data discs, play audio and video files, copy CDs and DVDs, and edit, organize, and share digital images.

The DVR-A07XL has unique hardware features, such as a resonance-absorbing suspension, which stabilizes the servo system; a liquid-crystal control system, which helps ensure precise recording on uneven



(TOP) PIONEER DVR-A07XL
(BOTTOM) TOSHIBA SD-R5272

disc surfaces (caused by warping or variations in disc thickness); and an auto-adjusting laser mechanism, which attempts to compensate for the deterioration that occurs every time a rewritable disc is recorded or erased. The drive also offers Pioneer's trademark defect-management technology, which improves performance and helps prevent imperfections from rendering a disc unusable.

This DVD burner easily captured first place among 8X drives on the key

DVD-R and DVD+R performance tests and ranked a close second on the DVD±RW packet-writing tests. It also did well on our DVD-ripping and CD-R-recording tests, but couldn't complete our VCD image-creation and audio CD-ripping tests because it lacks a DivX codec and MP3 encoder.

The Pioneer DVR-A07XL is fast, solidly built, and packed with innovative features that help guarantee the quality of the discs it burns. We recommend it without reservation for almost any type of business or home DVD-burning application.

Toshiba SD-R5272

Internal; 8X DVD-R speed, 4X DVD-RW speed, 8X DVD+R speed, 4X DVD+RW speed, 40X CD read speed, 32X CD-R speed, 10X CD-RW speed; ATAPI, \$149 direct. Toshiba America Information Systems Inc., www.sdd.toshiba.com. ●●●●○

The Toshiba SD-R5272 performs well and ships with a copy of Ahead Software's outstanding Nero 6 digital-media suite. But its performance test results aren't always the best, its CD-RW speed is limited to 10X, and its version of Nero isn't as comprehensive as the one bundled with the Memorex model. None of these caveats, however, is serious enough to convince us that the drive is anything but a bargain.

The SD-R5272's version of the Nero software suite includes an awesome array of audio and data disc-creation, packet-writing, media player, system-backup, label designer, disc-copying, and DVD-authoring applications. But unlike the version bundled with the Memorex drive, it lacks Ahead's new Nero Recode 2 module, which provides advanced features like MPEG-4 encoding and the ability to merge content from multiple DVDs onto a single disc. Toshiba is working to add these capabilities, but it has no plans to include an image-editing module.

The SD-R5272 was the only other 8X rewriter in the roundup to ship with the MP3 encoder and DivX support required to complete our entire performance test suite. It squeezed out first-place finishes on our DVD-ripping and DVD+RW packet-writing tests, and the drive transcoded a 30-minute DivX movie to a Video CD image nearly 4 minutes faster than the second-place Memorex drive. Although it didn't lead the pack on the other disc-burning tests, it never trailed by an unacceptable margin. The only time the drive struck out was when ripping a 65:18 audio CD to MP3 files: This task took 6:42, more than twice the time required by the first-place Memorex unit.

The Toshiba SD-R5272 may not be perfect, but it's an impressive performer for the money. ■

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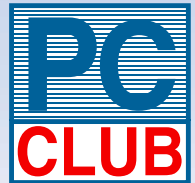


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LOW-COST DISPLAYS



With 17-inch LCDs going mainstream, you don't have to break the bank to get a big, beautiful display. We review 11 monitors starting at \$400.

By Alfred Poor Photographs by Thom O'Connor

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COLUMBUS WAS WRONG AFTER ALL: The world is flat—at least as far as displays are concerned. Flat plasma panels, rear-projection displays, LCDs, and even flat-faced CRTs are taking over at the office and at home. And if you're buying a new monitor for a computer this year, odds are that it will not only be flat, but will also be a 17-inch LCD. Sales of this size monitor in North America overtook 15-inch LCDs in the third quarter of last year, according to Chris Connery of the research firm DisplaySearch. This year 17-inch models are expected to outsell 15-inch units by two to one: more than 10.6 million 17-inch monitors compared with 5.25 million 15-inchers.

Given tight IT budgets, why are buyers moving up? The answer: The 17-inch models are a better value. As LCD production capacity increases and manufacturers realize efficiency gains, panel prices are slowly declining. This is narrowing the price gap between 15-inch and 17-inch models. Street prices for current 15-inch units start at around \$300, while you can get a 17-inch LCD for about \$400.

For that extra \$100 or so, you get an appreciably larger screen. A 17-inch panel has about 30 percent more display area. You also get more information on the screen, because there are more pixels. A typical 15-inch model has XGA resolution, 1,024 by 768 pixels, while a 17-inch model has SXGA resolution, with 1,280 by 1,024 pixels. That's a two-thirds increase in the number of pixels, which lets you either put more characters on the screen at a time or use more pixels per character so they're smoother and easier to read. Either way, you're likely to get a productivity boost.

LCD Choices

Here's what you can expect to pay and get in the three standard sizes of LCD monitors. You'll generally find that features and quality improve as the price goes up, since most manufacturers offer models at good, better, and best levels. But as our main reviews show, you can find premium features even in an inexpensive LCD. Prices are volatile, though, and respond quickly to supply shortages or surpluses.

▼ Features by price level

HIGH-END

Dual signal inputs (analog and digital); LCD panel with excellent viewing-angle performance and fast (12ms at best) pixel response time; narrow bezel; built-in speakers; stand with tilt, swivel, and height adjustments; panel rotates to portrait and landscape positions; TV tuner with picture-in-picture; USB ports; headphone and microphone jacks; all cables included.

MIDRANGE

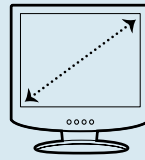
Dual signal inputs (analog and digital); LCD panel with adequate viewing-angle performance and 16ms pixel response time; stand with tilt and swivel adjustments; no digital cable included with the monitor.

LOW-COST

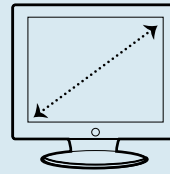
Analog-only signal input; LCD panel with limited viewing-angle performance and 25ms pixel response time; base with only tilt adjustment.

Size, price range, and pixel resolution ▶

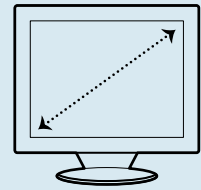
15-inch



17-inch



19-inch



\$440 to \$515

1,024 by 768

\$690 to \$860

1,280 by 1,024

\$775 to \$900

1,600 by 1,200

\$360 to \$440

1,024 by 768

\$525 to \$690

1,280 by 1,024

\$655 to \$775

1,280 by 1,024

\$285 to \$360

1,024 by 768

\$355 to \$525

1,280 by 1,024

\$529 to \$655

1,280 by 1,024

Business budgets remain constrained, so price-sensitive buyers are looking for the best bargain they can get. (For advice on doing just that, see the sidebar, "10 Tips for Buying LCDs.") Most manufacturers adhere to a "good, better, best" pricing strategy: They offer feature-laden models at the top end of the price range, middle-of-the-road models below that, and more stripped-down models at the low end. For an idea of what you can expect at these

such as height adjustment, swivel, and the ability to rotate the panel between portrait and landscape modes for the premium products. Most monitor makers also feel that a single analog connector is sufficient—and they're probably right—so they save the digital DVI connectors for the more expensive units.

With subtler features, such as maintaining a consistent image at different viewing angles, some manufacturers save money

ies when you stay in the shallow end of the price pool.

All of the 17-inch models we tested have an aspect ratio of 5:4. For a number of reasons, we did not include "17-inch wide" models, which have a 16:9 aspect ratio. The extra width is of marginal benefit for most office applications; it's most suitable for watching movies. More important, a 17-inch wide LCD screen has the same vertical dimension as a 15-inch model, so the total screen area and pixel count is substantially smaller than a standard 5:4 aspect ratio 17-inch model.

What about larger sizes? A few companies tried to make a market for 18-inch models, but they are clearly being squeezed out as the price difference between 17-inch and 19-inch models shrinks. Most 19-inch models have the same SXGA resolution as 17-inch displays, so you gain size but no more pixels—at a considerably higher price. As 19-inch resolutions increase to UXGA (1,600 by 1,200 pixels) and prices continue to fall, DisplaySearch expects 19-inch LCDs to overtake 15-inch models in unit sales by early 2005, but 17-inch LCDs will probably outsell them by better than two to one through the end of next year.

So for now, 17-inch LCDs are the sweet spot in displays. You can probably buy one for less than you thought—and still get some of the special features you crave.

...you certainly don't have to give up all of the goodies when you stay in the shallow end of the price pool.

three levels for each of the three most popular LCD sizes, see the chart above.

For this roundup, we asked all the major display manufacturers for their least expensive 17-inch LCD model. We ended up evaluating budget models from 11 different companies in a quest to find out what compromises you have to make if you want to save some money.

One typical compromise: A lot of manufacturers put a simple stand on their low-end models, with a hinge that lets you adjust only its tilt. They reserve features

by using cheaper LCD panels with inferior performance. (To learn about how we tested viewing-angle, gray-scale, color-ramp, and pixel-response performance, go to www.pcmag.com/insideplabs.)

During the course of our testing, we uncovered a surprise: Among the 11 monitors we reviewed, ranging from \$400 to \$525 in street price, we found some that offer premium features like portrait mode rotation and side-mounted speakers. You may still have to make compromises, but you certainly don't have to give up all of the good-

Envision EN7220



Though we were surprised by some of the premium features to be found in monitors in this group, our overriding concern in choosing the top 17-inch budget LCD was image quality. The Envision EN7220 wins on both counts.

We would have expected Envision to skimp on panel quality to make up for the added costs of a base that tilts, swivels, and changes height, and also rotates to give you a portrait-mode display. On the contrary, Envision's product was a top performer in our brightness uniformity, color tracking, and—most important—viewing-angle tests. If that's not enough, consider its little cups, suitable for pencils or flowers, and the little document or photo clips that you can attach to the sides of the monitor to personalize it.

If you want a premium monitor but don't want to pay a premium price, the Envision EN7220 may be just what you're looking for.



10 Buying Tips

- 1 Consider viewing-angle performance if you plan to use the monitor to view images. The best way to judge is to see the unit in person.
- 2 Don't insist on digital interfaces: The images they yield are only marginally better than those from analog connections.
- 3 Pixel defects are a fact of life, and manufacturers are often vague about what merits replacement under warranty. If you complain enough, you may be able to get the monitor replaced.
- 4 LCDs are very reliable, but you should still look for a three-year warranty.
- 5 Speakers in LCD monitors tend to be of poor quality, so we don't recommend you base your purchase on them.
- 6 Check to see what cables are included. Manufacturers often don't provide the digital cable on dual-input models.
- 7 USB ports included with monitors are usually non-powered, passive hubs. A separate device is often better.
- 8 Included programs that let you configure display settings using your computer keyboard or mouse are a big improvement over struggling with tiny front-panel buttons.
- 9 An adjustable base is important. Tilt and height adjustments improve ergonomics, and a swiveling base is convenient.
- 10 Before you spend more for a panel that can rotate to portrait mode, make sure you'll use it. Portrait-capable LCDs, however, often have superior viewing-angle performance.—AP

AOC LM729

\$489 list. AOC Monitors, www.aoc.com.



The LM729 from AOC blows away stereotypes, with features you'd expect only in a premium-priced LCD. It's not the lowest-priced 17-inch LCD you'll find, but it's competitive. Though we found some shortcomings, it delivers a lot for your money.

The base includes tilt, swivel, and height adjustments, and the panel can rotate from landscape to portrait orientation. It has lo-fi built-in speakers.

The front control buttons let you perform autosync operations and adjust the volume; we'd like to see a mute button, too. AOC includes adequate printed documentation and a more complete manual on CD.

The autosync feature failed to eliminate all jitter, but a tweak of the timing setting resulted in a rock-steady image. DisplayMate testing showed good brightness uniformity on all-black and all-white screens, no apparent pixel defects, and very good viewing angles in both the vertical and horizontal planes. Dark-gray response was good, but the panel failed to show light-gray shades. We also noticed moderate smearing of moving images.

AOC backs the monitor with a full three-year warranty. If you are looking for a good monitor with a choice of stand adjustments and speakers at a reasonable price, the LM729 is definitely one for your short list.

PROS: Versatile stand, portrait mode. Good viewing angle. Includes speakers. **CONS:** Autosync did not eliminate all jitter. Weak performance on light grays.



BenQ FP731

\$430 street. BenQ America Corp., www.BenQ.com.



The BenQ FP731 is what you'd expect in a budget monitor: a basic set of no-frills features at a competitive price.

This analog monitor's base has only a tilt adjustment, but that offers an adequate range of motion. The case has a thin silver bezel with an unusual mottled finish. It also has well-labeled control buttons, including one for autosync, which worked flawlessly in our testing. The printed documentation is thin, but the CD contains a much more thorough manual. A utility for adjusting the screen settings is a bonus.

The front panel gives quick access to the brightness and contrast settings, and our tests with DisplayMate revealed good

dark-gray and light-gray response without requiring much adjustment. Brightness uniformity was excellent on both all-black and all-white screens, and color tracking was accurate. Viewing-angle performance was about average, and we saw faint banding on color ramps. Moving images blurred a bit. Our evaluation unit also had one bright-pixel defect.

BenQ provides a three-year warranty on parts, labor, and backlight, as well as a quick-exchange program. The FP731 generally performs well and has the basic features you expect in a low-cost LCD. If you don't need a digital interface or a more adjustable base, the BenQ monitor will do.

PROS: Good CD documentation; good gray-level response; well-labeled front-panel controls. **CONS:** Tilt-only base; printed documentation is limited; faint banding in color ramps.



CTX S762G

\$400 street. CTX Technology Corp., www.ctxtec.com.

●●○○○

The S762G from CTX is the least expensive display we reviewed, yet it still offers premium features. It includes both digital and analog interfaces and has built-in speakers. Despite these pluses, serious image drawbacks detract from its appeal.

The stand offers only a limited tilt adjustment, though a handle on the back of the panel is a nice touch. The front-panel controls are well marked, but the rocker-style power switch was tricky to operate at first. The documentation is only fair, with inferior illustrations. The tinny-sounding speakers are adequate only for office needs. A front-panel mute button is a commendable addition, but you have to use the on-screen menus for autosync. It also includes an analog cable and a permanently attached digital cable.

Autosync worked well, but with an analog signal, gray re-



sponse was very poor at both the dark and light ends of the range, and color tracking showed an olive cast to the medium grays. With a digital signal, the light-gray and color tracking performance improved significantly, but dark-gray response was still poor. The display also had below-average viewing-angle performance.

We saw no apparent pixel defects, and brightness uniformity looked good for both black and white screens. Color ramps were fairly smooth, and there was no ghosting. Moving images showed some smearing.

CTX's warranty falls a bit short—only two years for labor, and the backlight only gets one year of coverage. Only those with the tightest budgets should consider the S762G.

PROS: Includes digital and analog interfaces; built-in speakers with mute button; well-marked front-panel buttons. **CONS:** Flawed performance, especially with analog signal; limited viewing angle; no autosync button; short warranty.

Dell E173FP

\$449 direct. Dell Inc., www.dell.com.

●●●○○

Dell sells more LCD monitors than anyone else, but the E173FP, despite its aggressive direct price, battles in this tough market armed with little besides the Dell brand name. The basic, analog-only monitor has a tilt-only base with a limited range of motion. The three buttons on the front panel have tiny, barely readable legends embossed in the black plastic, but they do give you fast access to the autosync, brightness, and contrast controls. Its narrow bezel, however, is one plus.

The autosync feature got the image size and placement correct, but unlike the autosync on most monitors, it failed to correct a small amount of pixel jitter. We were able to stabilize the image by tweaking the timing with the menu controls, but this was more difficult than it is with other monitors. Our testing showed good brightness uniformity on both black and white screens, no apparent pixel defects, and good color tracking. Banding appeared on color ramps, and gray response was weak at both the dark and light ends of the range. Viewing angles were limited, with hue shifts apparent at about 65 degrees on the horizontal plane and only 45 degrees above the vertical plane. Despite a claimed pixel response time of 16ms, moving images were a bit smeared.

Dell's one-year warranty on parts and labor is also the shortest of the pack. LCD monitors are very reliable, so the added risk is minimal, but this still reduces the value.

A few years ago, this monitor at this price with these features and performance would have been a runaway best-seller. But now the competition is fierce, however, and Dell will have to put more into their monitors if the company is to maintain its hold on first place.

PROS: Attractive price; good brightness uniformity. **CONS:** Limited viewing angle range; autosync did not result in jitter-free image; tilt-only base with limited range of motion.



Envision EN7220

\$450 street. Envision Display, www.envisiondisplay.com.

●●●●○



A fully adjustable base, a panel that rotates between portrait and landscape modes, and excellent viewing-angle performance are what you'd expect on a premium LCD, and that's just what you get with the inexpensive Envision EN7220.

The analog-only monitor comes with Portrait Displays' Pivot Pro software to manage the portrait/landscape rotation. The base also has tilt, swivel, and height adjustments. Printed documentation is minimal, but a more useful PDF manual is included on a CD. You even get little cups—for pencils or flowers. The front-panel buttons give quick access to autosync, brightness, and contrast settings, but the legends embossed on the black plastic are nearly impossible to see.

Brightness uniformity was excellent on a black screen, and there was only a faint shadow in the upper-right corner on a white screen. There were no apparent pixel defects, and the viewing-angle range was excellent. Color tracking was accurate and color ramps were smooth. Two snags: The autosync required a small timing tweak to get rid of a tiny bit of pixel jitter, and gray-scale performance was slightly less than ideal at both ends of the range.

Envision backs the display with a full three-year warranty. The flaws are relatively minor, the extra features and performance strengths are significant, and the price is very reasonable. If you have premium needs and a value budget, the EN7220 is a top candidate.



PROS: Rotates to portrait and landscape mode; excellent viewing-angle range; base has tilt/swivel/height adjustments. **CONS:** Autosync left small jitter in image; weak gray-level performance.

Gateway FPD1730

\$449 direct. Gateway, Inc. www.gateway.com.

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The competitively priced FPD1730 has the features you'd expect in a budget LCD monitor: only an analog interface and a base with just a tilt adjustment. Its image quality is also middle-of-the-pack, making it adequate but not outstanding overall.

The tilt-only base has a useful range of motion and holds the panel higher than most other simple stands, a welcome feature for tall users. The bezel is wider than on some monitors, and the case incorporates a handle. Buttons for autosync, brightness, and contrast are conveniently organized in a cross pattern. The menus don't have polished graphics, but they pack a lot of functions and information into a small space. No CD is included, but the printed documentation was among the best of the bunch.

In our DisplayMate testing, dark-gray performance was good, but the lightest gray shades were missing. Though white-screen uniformity was good, the black screen was sensitive to vertical viewing angle and had a glow along the bottom edge. As with most panels in this group, viewing angles were limited, especially in the vertical plane, and faint but noticeable ghosting appeared on high-contrast images. We also saw moderate smearing of moving images, despite the monitor's 16ms pixel-response rating.

Gateway limits the warranty to just one year; a typical three-year warranty would be more appealing. Display quality trumps the price and other considerations, making the FPD1730 a middle-ground competitor.

PROS: Good front-panel controls; above-average docs; effective on-screen menu. **CONS:** Limited viewing angle range; poor light-gray performance; tilt-only base.



LG Flatron L1710S

\$500 street LG Electronics U.S.A. Inc., www.lgusa.com. ●●●○○

Although its cost is near the top end for a budget 17-inch LCD, you should be able to find the Flatron L1710S at competitive prices. It offers unique features, but shares many of the flaws and limitations of other mid-range products.

The base has both tilt and swivel adjustments. The front-panel controls are legible, with buttons for auto-sync, brightness, and contrast. The on-screen menu lacks graphic pizzazz, but it's informative. Presets let you quickly switch settings for different uses, such as editing text or viewing photos.

The box-top printed documentation is good, and the included CD is fairly good, though it referred to USB ports that were not present on our test unit.

The monitor comes with Colorific color calibration software and a printed color-chip card to aid in adjusting the screen. But if color precision is a major concern, you'll probably want a different display.

The L1710S showed good white-screen brightness uniformity, good color tracking, and smooth color ramps. But we saw faint ghosting on high-contrast images. Black-screen uniformity was strongly affected by the vertical viewing angle, and we noticed a glow along the bottom. The panel had trouble displaying light-gray shades. Moderate smearing showed up on moving images.

LG backs the monitor with a three-year warranty, but the backlight gets just one year. Even with a full backlight warranty, the L1710S has middling image quality and not enough extras to bring it above average.

PROS: Comes with color calibration utility; preset configurations for different applications; good on-screen menu. **CONS:** Limited viewing-angle range; only one-year warranty on backlight; fair light-gray performance.



NEC MultiSync LCD1760NX-1

\$525 street. NEC-Mitsubishi Electronics Display of America www.necmitsubishi.com. ●●●○○

The MultiSync LCD1760NX-1 wins the prize for the longest official model name in this group. It also earns the dubious distinction of being the most expensive "value" monitor we tested. Some attractive features help justify the extra cost, but its image quality handicaps the display and keeps it run-of-the-mill.

The front-panel buttons are tiny and the embossed legends are almost impossible to read, but that doesn't really matter, because you can download a free NaViSet utility from the NEC-Mitsubishi Web site and control all monitor settings from your keyboard—much easier than any front-panel system.

The monitor case has tilt, swivel, and height adjustments with good range, and contains both analog and digital connections. You can connect the one display to two computers, but you have to supply your own digital DVI-D cable. The printed documentation is of average quality, and no CD is included.



In our DisplayMate testing, the LCD1760NX-1 showed the same limited viewing-angle range as most other low-cost 17-inch LCDs. There was also faint ghosting on high-contrast images, though this was more noticeable with an analog signal than a digital. With both signals, gray-scale response was weak at the dark end of the range and only adequate at the light end. Black screens showed some glow at the bottom of the screen, though white-screen uniformity was good. With an analog signal, the autosync failed to eliminate all jitter, but this was easy to correct with timing settings.

The higher price for the LCD1760NX-1 can be justified somewhat by its extra features, but ultimately, a lower-priced monitor with superior image quality would be a better value.

PROS: Free configuration utility; digital and analog interfaces; source select button on front panel; versatile base. **CONS:** Limited viewing-angle range; autosync required tweaking of timing settings; weak gray-shade performance; high price.

Planar PE1700

\$430 street. Planar Systems, Inc., www.planar.com.

●●●○○

The Planar PE1700 is very reasonably priced, but it fails to compete effectively on features and performance. It has flawed display quality and few bonus features.

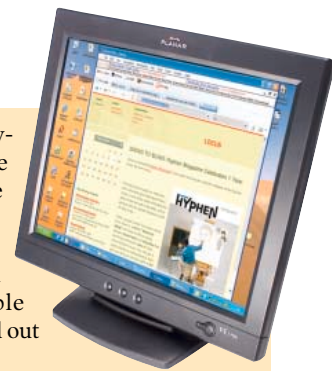
The stand has only a tilt adjustment, with an adequate range of motion. The monitor has just one analog interface, but its design makes attaching the signal and power cables a snap. The bezel is unfashionably wide, and the embossed icons on the black-plastic front-panel control buttons are all but invisible. The buttons provide fast access to autosync and brightness controls, but the on-screen menu system's old-fashioned interface is more difficult to use than most: It's simply a rectangular arrangement of icons. Printed documentation is better than average, but the bundled CD has no additional manual.

The autosync produced a rock-steady image with no tweaks required, and uniformity was excellent. Unfortunately, the screen

suffers from the same limited viewing-angle performance as most of the monitors in this group, and response to gray shades at both the dark and light ends of the scale was very poor. We also saw faint ghosting in high-contrast images. Considerable smearing of moving images rounded out the unit's lackluster performance.

Planar does provide a full three-year warranty, along with a free second-day air freight quick-exchange program. Coupled with the low price, this should make the PE1700 an attractive choice, but the below-average image quality and limited viewing-angle range diminish its appeal. Better choices are available.

PROS: Easy cable connections; above-average printed documentation; free quick exchange under warranty. **CONS:** Limited viewing angle; poor gray-response performance; on-screen menu system more difficult to use than most.



Sharp LL-172A

\$479 direct. Sharp Systems of America, www.sharpsystems.com. ●●●●○

The analog-only Sharp LL-172A has a stylish case, built-in speakers, and a slightly higher price tag than most monitors in its class. Aside from the weak viewing-angle performance typical of this price group, the panel exhibits decent image performance.

The screen is surrounded by a desirably thin plastic bezel with a silver control panel at the bottom, all mounted on a silver base. Control buttons are well marked and provide quick access to speaker volume, autosync, and preset modes. A convenient headphone jack is mounted on the front panel; only a mute button is missing. The speakers are typical for an LCD monitor, fine for office work but not for music.

Printed documentation is better than average, but the on-screen menu system is primitive. A bundled CD contains only the .INF files for Windows configuration and .ICM color profile files—no online documentation, autoplay, or installation utility.

The display's autosync feature worked flawlessly, we saw no pixel defects, and gray-level response was excellent for dark and light shades. We saw a faint glow at the bottom of the panel on a black screen. Color tracking was good, but there were faint bands visible on color ramps. The biggest flaw was its limited viewing angles, especially in the vertical plane. We also saw moderate smearing of moving images.

The thin bezel and speakers are pluses for the LL-172A, as is its mostly good image quality. But limited viewing angles leave it only slightly better than the middle of the pack.

PROS: Stereo speakers; better than average printed documentation; good gray-level performance. **CONS:** Limited viewing-angle performance; minimal CD content; on-screen menu system more difficult to use than most.



ViewSonic VE710s

\$450 street. ViewSonic Corp., www.viewsonic.com.

●●●●○

The VE710s is ViewSonic's entry-level 17-inch LCD monitor model, and it's priced just below most competing models. You get speakers, a bit of style, and slightly better image performance than most similar monitors, but base adjustments are limited, and for a little more money, you can get a unit with a superior picture.

The analog-only display has a permanent VGA cable. The black base with stylish chrome highlights has only a tilt adjustment, but it has a good range of motion. The tiny embossed legends on the chrome buttons, though they are nearly impossible to read, provide fast access to autosync, brightness, and contrast settings. The on-screen menu is fairly easy to use, but printed documentation is nearly nonexistent. The bundled CD automatically installs drivers, color correction files, and a comprehensive manual in PDF format.

The autosync feature worked well. Performance at the dark and light ends of the gray scale was generally good, and brightness uniformity looked good on both black and white screens. We did have to decrease the contrast a bit to get the best results. We saw no apparent pixel defects, and color tracking was good, with only faint banding on color ramps.

Faint ghosting showed up on high-contrast images, and the viewing-angle performance didn't match the best displays we tested, especially in the vertical plane.

ViewSonic offers a full three-year warranty and an express-exchange program.

PROS: Built-in speakers; generally good image quality; captive VGA cable. **CONS:** Limited viewing-angle range; little printed documentation; difficult to read front-panel button legends.



MORE ON THE WEB To read about how we test LCDs, point your browser to www.pcmag.com/displays.

OUR CONTRIBUTORS: Alfred Poor is a lead analyst for *PC Magazine*. Associate editor Michael W. Muchmore was in charge of this story.

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Small-Business

By John Delaney

Illustrations by Jack Harris

READ ON TO LEARN

- The three classes of small-business systems and the price range for each.
- Which components you need in your small-business PCs and where you can reasonably cut corners.
- How to deal with having many systems yet only one employee wearing the IT hat part-time.
- Which types of upgrades make sense for the future and how to plan for them now.

Businesses of all sizes face similar challenges when buying desktop systems. Understanding the needs of each user and matching those needs to the right system can be daunting given the fast-paced evolution of technology. But for small businesses, the challenges don't end there. With limited budgets and IT resources, these businesses must aggressively shop for systems that they can not only afford but also maintain with relative ease.

A company buying only 20 or 30 systems typically doesn't qualify for big-volume corporate discounts. Add to that the issues of setup and installation, image migration, deployment, and ongoing support—all of which are part of the total cost of ownership (TCO) for each machine. In many cases, the person responsible for procuring desktops for his small business wears many hats: owner, purchasing agent, IT manager, and in-house support technician. And for even smaller businesses with no dedicated IT staff, such tasks can be laborious and expensive, taking valuable time away from critical business activities.

In this buying guide, we'll help you choose the right desktop for your small



For budget-conscious small businesses, finding just the right fleet of desktops is a real challenge. Here are the things to look for and consider when shopping.

Desktops

TOP 10 Desktop TIPS Buying

business and discuss the various programs and services PC manufacturers offer specifically for companies with limited technical and financial resources. We'll cover the different processor types and discuss factors such as hard drive technology and capacities, memory choices, connectivity options, integrated components versus third-party add-in cards, and management solutions.

System types

Small businesses have three classes of desktops to choose from: low-end, midrange, and high-end systems.

Low-end machines are typically based on an Intel Celeron or AMD Athlon XP CPU and cost under \$500. They make the most sense for users who do light word processing, e-mail, and Web browsing, as well as using other office apps.

Midrange systems come into play if your business requires machines that can smoothly render digital video or run computation-intensive applications. These boxes are based on an Intel Pentium 4 or Athlon 64 processor and usually cost between \$600 and \$1,000.

High-end machines are required by businesses running CAD/CAM (computer-aided design/manufacturing), CAE (computer-aided engineering), and digital content-creation applications. Based on pricier versions of AMD and Intel chips—including the Athlon 64 FX and Pentium 4 Extreme Edition—these systems start at around \$1,200 and go up quickly from there.

Features

Processing power, graphics capabilities, and storage capacity are all factors that must be considered carefully when choosing systems for your business.

But to do so, you must first define the workloads of your PCs. For example, if your desktops will be used for light clerical work, there's no need to go overboard with processing power and additional options, such as recordable DVD drives and high-end graphics and sound cards, as these components can add hundreds of dollars to the price of each system.

On the other hand, don't short-change your business. Although you may be tempted to save money by configuring your systems with the bare necessities, you may find that they cannot run complex software applications efficiently. The general rule of thumb is to buy systems powerful enough to handle your immediate needs yet flexible enough to handle future requirements. With that information in mind, you can better choose the right components for your systems.

Processors. When deciding on what processor should be in your business's machines, keep in mind that it's not all about gigahertz anymore. AMD has been using performance ratings for a while now, with a sort of implication that 3000+ performs like Intel's 3.0-GHz chip. The rating also helps tell AMD's parts apart, so an AMD Athlon 64 3400+ will outperform an Athlon 64 3200+ on most measurable tests. Similarly, Intel has its own new processor num-

1. Match your desktop configuration to your business needs. If you buy strictly according to price, you may end up with systems that can't handle the workload. Likewise, don't overspend on options you're not likely to use.
2. Leave room for expansion. You may not need lots of memory or recordable optical drives now, but you may need them down the road.
3. When it comes to storage, bigger is better. You'll spend a little more up front, but if you skimp now, you'll pay later.
4. Don't be suckered by "free" software offers. In some cases, all you're getting are trial versions that expire in 60 days.
5. When pricing desktop systems, check whether the cost includes monitors. If not, you may have to add \$100 or more to the bottom line of each system.
6. Buy your desktops from an established manufacturer. You may end up paying a bit more, but chances are the company will be there when you need help.
7. Consider investing in an extended on-site warranty plan. If your technical resources are stretched to the limit or nonexistent, such a warranty could mean the difference between a few hours of downtime and several weeks of lost productivity if any of your systems have to be shipped out for repair.
8. If money is tight, consider a vendor financing package. Most major vendors offer financing deals designed for small businesses with limited cash flow.
9. Evaluate your workspace before you buy. Desktops come in several form factors to fit even the tightest work areas.
10. Don't take on more than you can handle. Most desktop vendors provide consulting and IT support services specifically geared to small companies so you can concentrate on your business.—JD



◀ LOW-END TASK HANDLER

PRICE • Roughly \$450

PROCESSOR • 2.4-GHz Celeron D or Athlon XP 2400+

MEMORY • 256MB DDR SDRAM

GRAPHICS • Integrated graphics

HARD DRIVE • 40GB

OPTICAL DRIVE • Single CD-ROM drive

A system based on this class of processor is perfect for very basic computing, such as e-mail and light word processing. A monitor will cost extra, but not much; for most types of entry-level applications, a \$100 15- or 17-inch CRT may even suffice.

The built-in speakers or low-end stereo speakers that come with these PCs should be enough for music and business sounds (beeps and Web page sound effects).

Some of these machines can even be found for less as part of occasional online promotions, making them easily replaceable commodities that are hardly worth a purchased warranty.

Apple: The Alternative

Intel- and AMD-based desktops, whether they run Windows or Linux, are by no means the only game in town. The Apple Power Mac systems are the computers of choice for many businesses that work with digital content, desktop publishing, and multimedia and graphic design applications. The Apple Power Mac G4 can be configured with one or two 1.25-GHz Motorola PowerPC G4 processors and hold up to 2MB of DDR (333-MHz) memory.

The base system, priced at \$1,299, ships with a single processor, an 80GB ATA hard drive, 256MB of memory, a 64MB ATI Radeon Pro 9000 graphics card, and a DVD/CD-RW combo drive. A full-blown G4 system costs about \$3,200 and includes dual processors, 2GB of memory, the 128MB nVidia GeForce4 Titanium graphics card, four 160GB drives, a SuperDrive (DVD-R), and a DVD/CD-RW combo drive. And that \$3,000-plus price doesn't even represent the top of the line.

Apple's flagship system, the Power Mac G5, is a dual-processor system with chips based on the 64-bit IBM PowerPC 970 and is available with processor speeds of 1.8, 2.0, and even a liquid-cooled 2.5 GHz.

The G5 can have up to 8GB of 400-MHz DDR memory. Prices start at \$1,999 for a system with dual 1.8-GHz processors, 256MB of memory, an 80GB SATA hard drive, a 64MB nVidia GeForce FX 5200 Ultra graphics card, and a SuperDrive. But a fully configured high-end system goes for \$8,524 and contains dual 2.5-GHz processors, 8GB of memory, dual 250GB SATA hard drives, the nVidia GeForce 6800 Ultra graphics card, and a SuperDrive.

A new iMac is in the works, too, to replace the popular one that is now off the market. Businesses that desire the Mac OS platform and can wait a few months might find this new iMac to be the affordable dream machine.—JD

bering scheme, so when you're shopping for a new PC, you will be able to tell that an Intel Pentium 4 560 processor is a more feature-rich and likely better performer than a Pentium 4 520. The chips just cited—the Athlon 64 and the P4 5-series CPUs—are the midrange processors from each vendor.

Similar rankings exist in the value space for the Athlon XP and Celeron D series. An Athlon XP 3000+ will outperform an Athlon XP 2400+, and a Celeron D 335 will outperform a Celeron D 320. The high-end Athlon 64 FX and Pentium 4 Extreme Edition, also has a "higher number is better" scheme, with the Athlon 64 FX-53 outperforming the FX-51, for instance. The P4 Extreme Edition relies on clock speed to indicate performance.

To put this in perspective, low-end machines house a Celeron D or Athlon XP, creating what is still a clerical powerhouse, for up to \$500 less per seat compared with midrange and high-end PCs. This is the CPU class to use if your day-to-day tasks involve e-mail, Web-based research, and basic computing tasks. Note that the main difference between the Celeron and Celeron D chips is that the D models are based on a newer architecture and a faster front-side bus—533 MHz compared with 400 MHz—thereby offering better performance. The Athlon XP chips feature the AMD QuantiSpeed Architecture, which allows a CPU to process more data per clock cycle for optimal performance.

Midrange boxes, or more robust office PCs, have to deal with presentation graphics, database management, and maybe software development or basic content creation. Such systems need a Pentium 4 5-series chip or an Athlon 64. The latest Pentium 4 offerings support bus speeds of 800 MHz and feature Intel Hyper-Threading (HT) technology, which improves performance when running several applications simultaneously. The Athlon 64 has, as its name implies, 64-bit capabilities. But it's a stellar 32-bit performer, too—an asset considering that small businesses aren't likely to be running a 64-bit OS any time soon.

For the majority of small-business buyers, the aforementioned processors are the "it" chips to have. Only for 3D development, CAD/CAM, industrial design, architectural apps, and any other kind of high-end content creation would you need a pricey processor like the Pentium 4 Extreme Edition or the Athlon 64 FX series.

Memory. Entry-level desktops are usually configured with 256MB of memory, which is the bare minimum for light office work. We suggest a minimum of 512MB if you're going to be holding on to your systems for a while. Most business-class desktops can be configured with up to 2GB or 4GB of DDR (double data rate) or DDR2 memory, depending on the motherboard. If you

plan on upgrading one day, don't buy desktops with all of their memory slots filled. The idea is to be able to add to your existing memory rather than replace all the modules to achieve maximum memory capacity.

The type and amount of memory you can use depends on the motherboard chipset. For example, systems with Pentium 4 processors can use a number of chipsets, from the value-based Intel 845 family, which supports up to 4GB of DDR memory, to the latest Intel 925X Express chipset, which supports up to 4GB of DDR2 memory.

DDR2 is the latest evolution in memory technology, promising faster speeds, lower power consumption, and higher bandwidths. As with processors, the greater the speed and size (capacity) of the memory module, the more expensive it is. To upgrade a system from 128MB to 256MB using DDR memory can cost as little as \$40, but the leap to 512MB may add another \$120 to the price tag. To upgrade a system with 512MB of DDR2 memory to 1GB costs around \$100, but the jump to 2GB is closer to \$400.

Motherboard. Knowing beforehand what type of motherboard your business's desktop has is important, especially if you plan to upgrade at a later date. Specific motherboards and chipsets are designed for specific processors, and each has a fixed amount of expansion slots, USB ports, hard drive controllers, and legacy ports for connecting printers and other peripherals. Most but not all have a slot for adding a third-party graphics card. Don't assume that you can simply upgrade to a faster processor or high-end graphics card without knowing which components are supported. Find out your options before you buy.

Storage. It's always a good idea for businesses to configure each desktop with a hefty hard drive or two. Although upgrading to a higher-capacity hard drive is fairly easy, the process can be time-consuming and requires a certain amount of technical know-how to do the job right. For general office apps, we suggest systems with at least an 80GB hard drive to start. When you're dealing with large file types (such as video clips or digital images) you'll find that an 80GB drive can fill up pretty quickly. In this case, we recommend moving up to 160GB.

When judging the drives you buy today, you should also consider the technologies behind them. The two main choices for business desktops are ATA (parallel) and SATA (Serial ATA) hard drives. SATA is the likely successor to ATA technology and is expected to provide data transfer rates of 300 MBps and more eventually, compared with a maximum rate of 133 MBps for ATA. And SATA drives use a thinner, shorter cable, improving airflow inside the chassis and resulting in cooler system temperatures. We also recommend drives that operate at 7,200 rpm instead of 5,400-rpm drives.

With all hard drive choices, keep in mind that if local data is mission critical and no dependable backup solution is in place, businesses will want to have RAID 1 configurations. In RAID 1, two identical hard drives mirror each other using a RAID controller interface. Should one drive fail, the other can keep the system running with all the data intact until another drive is added to rebuild the mirror image. The only downside is that you pay for twice as much hard drive space as you actually use. RAID 0 (also called *data striping*) uses both drives to increase performance, but that configuration doesn't really make sense in most businesses. Unless your business is graphics- or video-intensive, going for RAID 0 performance is overkill and not worth the added cost.

The cost difference between a 40GB and an 80GB ATA drive is about \$35—less than \$1 per GB. Adding another \$45 or so brings you up to a formidable 160GB of storage capacity. SATA drives are similarly priced and will need an add-in controller on some value systems that do not support SATA on the

▼ A MIDRANGE PLEASER

PRICE • Roughly \$600 to \$1,000

PROCESSOR • 2.8-GHz Pentium 4 520 or Athlon XP 2600+

MEMORY • 512MB DDR SDRAM

GRAPHICS • Integrated graphics with AGP port for customization

HARD DRIVE • 80GB

OPTICAL DRIVE • Single CD-ROM or CD-RW

Sure to be found on most small-business employees' desks are PCs that have the power for intensive office tasks and the occasional power app, such as a Web design program. Such systems have some pep at a decent price (not including a monitor).

You can turn this basic platform into the right box for almost anyone in the company by tweaking the configuration, adding extra storage, graphics, or memory. This approach still preserves a basic homogenous environment for ease of maintenance.



In the midrange category, a 17-inch LCD monitor is a good idea: It's easier on the eyes than a CRT and saves on power and desk space to boot. You can also buy small-form-factor PCs for your employees: The smaller desktop cases are easier to put in an out-of-the-way place, like on the underside of a desk or behind an LCD monitor. Most employees don't need the expansion space a tower offers and will thank you for the extra desk space.

▼ HIGH-END HORSEPOWER

PRICE • About \$1,200 and up

PROCESSOR • 3.6-GHz Pentium 4 560 (800-MHz front-side bus, with Hyper-Threading) or Athlon 64 3400+

MEMORY • 512MB to 1GB of DDR 400 or DDR2 SDRAM memory

GRAPHICS • nVidia GeForce 5300 or ATI Radeon x300 card

HARD DRIVE • 160GB SATA

OPTICAL DRIVE • DVD-R or DVD/CD-RW combo

Factor in plenty extra for the big monitor you may crave with this type of system. To take advantage of CAD or other graphics-intensive business apps, you need to broach the high-end market. And our sample system shown here is modest.



Going to either the Pentium 4 Extreme Edition or the Athlon 64 FX-53 will likely bring a system with still-reasonable support components well into the \$2,000 range. You can also break the bank by adding performance graphics like the nVidia GeForce 6800 or ATI Radeon X800 graphics cards for stellar 3D performance. You have to decide whether your intensive apps are quite that intensive.

Look for a tower case if your users need to upgrade over the life of the PC. Your IT guy, if you have one, will thank you.

motherboard. If you require the benefits of a RAID configuration, we recommend choosing a desktop with an integrated SATA controller that can handle RAID 1, not just RAID 0.

Graphics. Not long ago, a third-party graphics card was necessary to display decent 3D graphics, but today's motherboard chipsets offer more than adequate integrated graphics for most business needs. The new Intel 915G chipset features GMA (Graphics Media Accelerator) 900 technology, which offers improved DirectX 9 hardware acceleration and 3D graphics performance without the need for a dedicated graphics card. For AMD-based desktops, nVidia nForce2 motherboards provide integrated GeForce4 MX graphics technology. For graphics-intensive engineering, animation, or video-streaming applications, a high-end graphics controller with at least 128MB of video RAM is preferable.

Integrated graphics solutions have always taken a back seat to third-party add-in cards, and in the past, on-board graphics was the logical and cost-effective choice for businesses that require blazing 3D graphics performance. This still holds true, but with the introduction of the Intel 915G chipset, integrated graphics has gotten a much-needed performance boost, making motherboards with the solution good enough even for most midrange office machines. Besides being cheaper than a dedicated

graphics card, integrated graphics means one less piece of hardware to support—good news for IT personnel.

On the downside, if the integrated controller fails, the motherboard has to be replaced, whereas a graphics card can be replaced within a matter of minutes. High-end desktop AGP 8X graphics cards with 256MB of memory can cost up to \$400, whereas workstation graphics controllers can cost thousands of dollars.

Connectivity. Integrated Fast Ethernet (10/100) is pretty much standard on all desktops these days, but if your business is set up for Gigabit Ethernet (10/100/1,000) connectivity, look for desktops with integrated Gigabit Ethernet ports to avoid using expansion slots. As an alternative to wired Ethernet, many small businesses are turning to wireless networking, especially for offices where cabling can be difficult and expensive. Desktop systems can connect to a wireless network via an optional internal PCI or external USB wireless adapter.

Optical drives. Nearly every desktop system ships with a CD-ROM or DVD-ROM drive, but if you want to be able to perform local backups on your users' systems, make sure they have recordable drives. For around \$50, you can add a DVD/CD-RW combo drive. For high-capacity optical storage, adding a DVD±RW drive will cost somewhere in the neighborhood of \$100. The latter is especially important for off-loading high-end video or other projects that could otherwise fill a hard drive.

Integrated components. In most cases, on-board components such as Ethernet, audio, and RAID controllers are now equal to their third-party add-in counterparts in terms of performance. Unless your business requirements call for specialized, high-performance hard drive controllers, audio processors, or multiple Ethernet connectivity, using current advanced integrated components will save you money while freeing up expansion slots for future use. Many of the latest motherboards provide 5.1-channel audio output (even 7.1 in some new boards), Gigabit Ethernet, advanced SATA RAID solutions, and dual-display support, without the need for expensive add-in cards.

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Services for the IT-Less

Many vendor-supplied services are available to small-business owners who lack the technical skills to select and support their desktop investment. Look for a vendor who will provide a complete assessment of your computing requirements and suggest desktop systems based on your specific needs and budget limitations.

In addition to system setup and installation services, there are help desk and hardware support programs that provide 24/7 technical support via a toll-free number, with as little as a 2-hour on-site response time around the clock. Some services also handle data and operating system migration, hardware and software upgrades, network planning and installation, and physical relocation of existing systems, as well as on-site and online training programs for employees.

As you move more fully into the total-care solutions just cited—the traditional value-added reseller (VAR) space—pricing takes on a whole new dimension. You have to consider carefully how much of that help you actually need if it's adding a significant amount to your total costs.—JD

The Future

Beyond choosing the key components of your small-business PCs, here are a few additional considerations related to the maintenance and

possible upgrading of your systems down the road.

Manageability. The machines we're helping you choose in this guide are clearly not "managed PCs." Sure, many PC vendors offer preloaded management tools—such as Dell OpenManage, HP Client Manager, and IBM Rapid Restore—on select business desktop models. Such tools automate certain management tasks and enable remote diagnostics, upgrades, and backups over a network, thereby freeing up valuable technical resources. But who's going to do such tasks?

Even if the systems come with useful utilities, chances are your business has no one who can use these apps effectively to manage the boxes centrally. The best method is to find a management app you or someone else on the staff understands well enough to take advantage of. Only large corporations and medium-size businesses with notable IT ranks can truly harness the power of managed PCs. If your business is on the larger side, you may want to give these apps a look.

All businesses have to worry about deployment, security, disaster recovery, and software/BIOS updates, making even a small fleet of systems a challenge to manage and maintain. Try to minimize some headaches by choosing desktops that share a common drive image and common components, as they are much easier to maintain than systems with various operating systems, applications, and hardware features.

Expansion. Inevitably, there will come a time when you face the decision of whether to upgrade or replace your current desktop PCs. Adding more memory, faster hard drives, higher-end graphics cards, or more powerful processors can increase performance, so just be sure to choose systems that offer an easy upgrade path.

Look for systems that have available memory slots, multiple internal and external drive bays, at least two or three free PCI slots, and multiple USB ports. The latest crop of motherboards support up to eight USB 2.0 ports, multiple variations of DDR memory (including the newest DD2), high-bandwidth I/O technologies (PCI Express), SATA ports, as well as legacy I/O devices (ATA/100 drives). High-end systems should have at least one FireWire port, especially if they will be used for editing digital video. Look for at least one USB port the front of the machine in addition to the rear ports.

Serviceability. For small businesses with limited IT resources, serviceability is a key factor. Over the past several years, many PC manufacturers have designed their desktops to have tool-free chassis, meaning that the cover and internal parts can be removed without a screwdriver. But many such systems still require tools to remove drives and expansion boards. For the ultimate in serviceability, look for a system that provides easy access to all internal components and lets you easily remove them via clearly marked tabs or buttons.

Systems with flip-up drive bays and easy-to-open clamshell casings that let you inspect the interior without having to unplug cabling are tremendous time-savers.

Warranties. Most desktops come with a standard one- or three-year warranty, depending on the vendor and desktop model. Generally speaking, extended on-site warranty programs are a good idea if you lack in-house technical support. But it's important to read the terms of the warranty carefully, or you may be surprised to find that you have to carry the desktops in to a repair depot for service or spend an inordinate amount of time on the phone with a service rep before the company sends a technician to your business. This is also true for extended-warranty programs that promise next-day on-site service. Make sure you understand exactly which components are covered and which aren't. ☰

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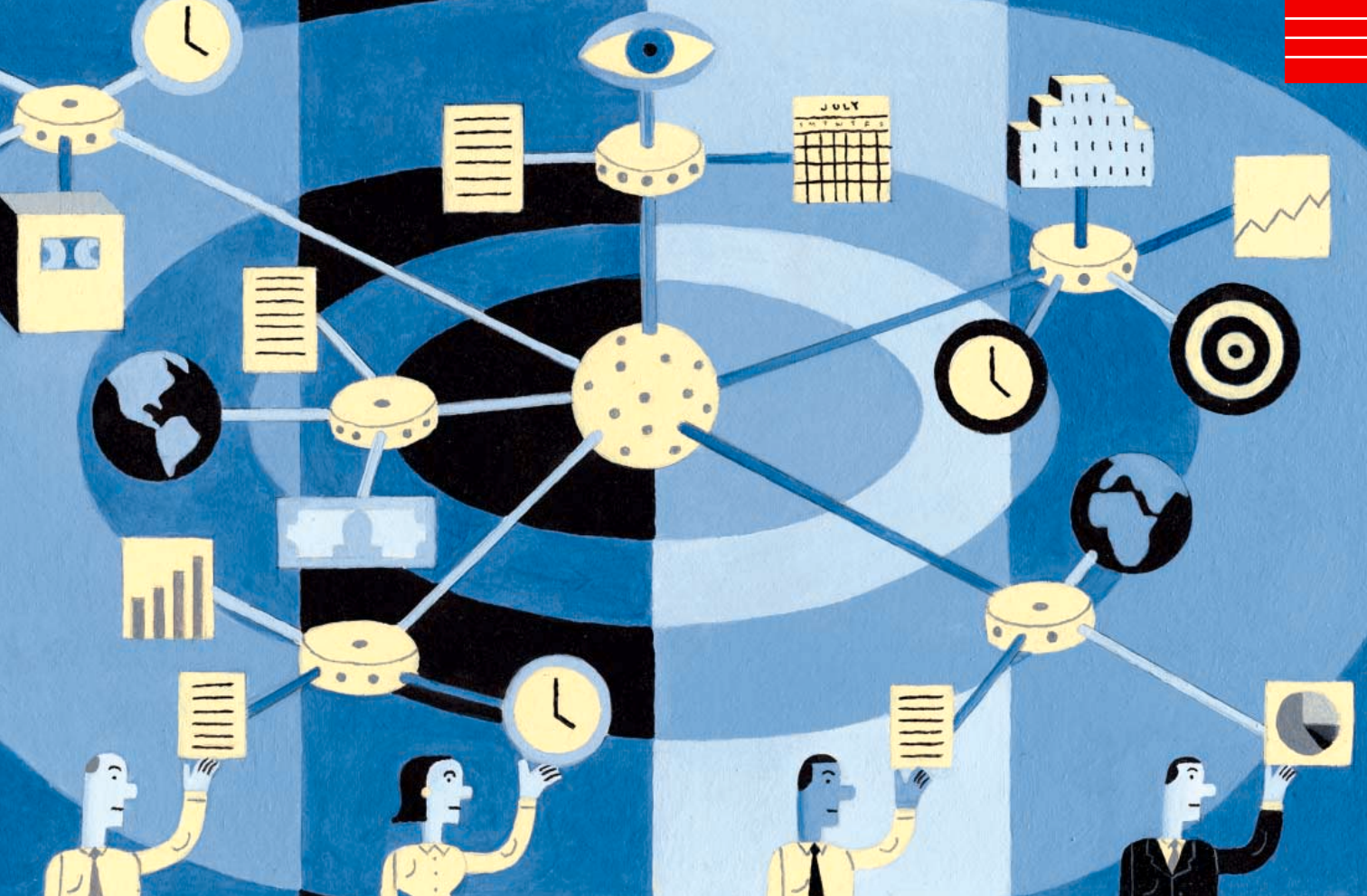
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A Better Blueprint for Business

A service-oriented architecture approach to IT can bring agility and long-term savings to businesses. We cut through the hype and examine the pros and cons.

CONSIDER THE REALITIES of doing business in the 21st century: Customers and partners expect a single view into your company. Managers need to track merchandise across multiple warehouses and inventory systems. Regulators and auditors require consolidated financial statements, and new business initiatives call for access to data and services across numerous systems.

Clearly, some kind of structure is needed, and *service-oriented architecture*—SOA—is shaping up to be the long-sought unified-field theory of the IT universe. The concept should be on the radar of every savvy CTO or IT manager. And in principle, all

the major technology players, from Microsoft and Sun to BEA and IBM, are backing a single approach.

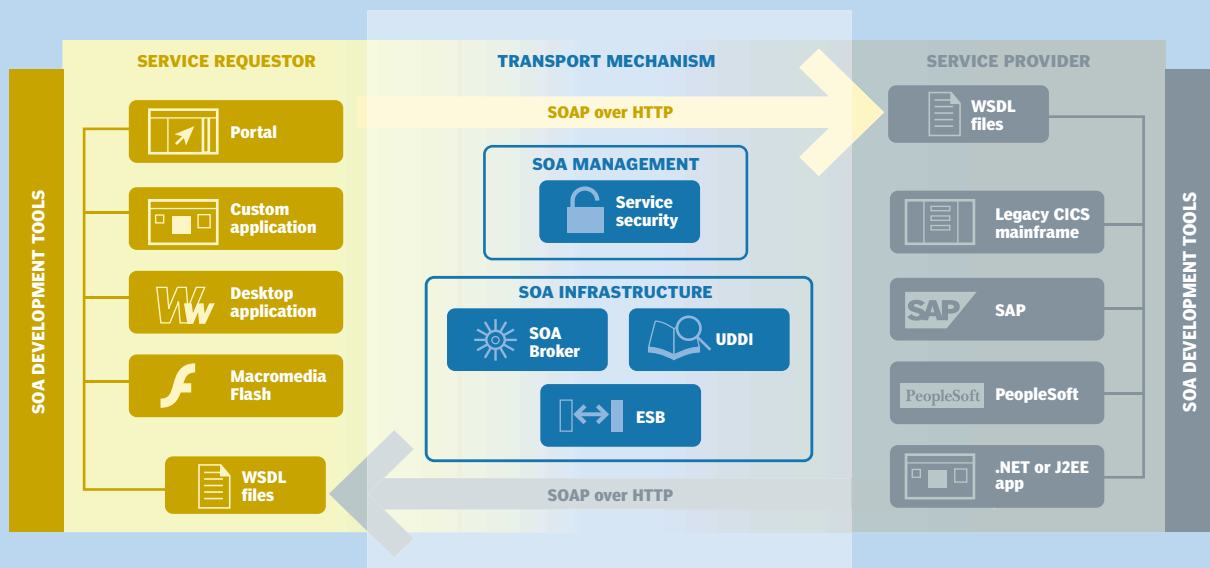
At its heart, SOA is a reaction to a situation that many growing companies have found painful: monolithic applications that lock them into relationships with high-priced consultants whenever they want to customize or integrate systems. SOA pushes companies to think about business processes, integration, and connectivity from the beginning, not after the fact.

Let's take a look at the applications, challenges, and myths surrounding service-oriented architecture.

BY ROBERT P. LIPSCHUTZ ILLUSTRATION BY JAMES KACZMAN

The SOA Ecosystem

Businesses are starting to adopt service-oriented architectures and explore their potential to enable a new generation of efficient, nimble, and reusable applications. We present the core SOA stack in this diagram, but the amount of emphasis you need to place on each technology component may vary according to your business requirements.



SOA DEVELOPMENT TOOLS Vehicles for applications to become part of the SOA ecosystem. These tools help define WSDL, the lingua franca for describing interfaces in SOA communication. SOA tools include Sun's Java Studio Creator and BEA WebLogic Workshop.

SERVICE REQUESTOR Elements that request services. These can be custom applications, desktop applications, Macromedia Flash, or portals. They run on platforms such as IBM's WebSphere on Linux, or Microsoft Windows.

SERVICE PROVIDER Exposes business functionality as a service. Providers can be an ERP system like SAP, an HR system like PeopleSoft, or a .NET or J2EE application.

TRANSPORT MECHANISM Enables transfer of Web services. SOAP over HTTP is the most common way to transport Web services.

SOA also supports other transports such as IBM's WebSphere MQ family and JMS. In a typical SOA model, communication is asynchronous, so one system can send a message to another and not have to wait for a response.

SOA MANAGEMENT Manages Web services at runtime. It includes SLA monitoring, reliable Web services messaging, and service security, which involves authentication, authorization, and data integrity.

SOA INFRASTRUCTURE The runtime environment for invoking Web services. It controls and negotiates the connection and operation between requestor and provider.

The enterprise service bus (ESB) is an approach to standards-based messaging middleware. An SOA broker handles the routing and orchestration of services. UDDI (Universal Description, Discovery, and Integration) is a registry and discovery utility for SOA services.

THE ABCS OF SOA

In theory, SOA is a way to modularize your systems and applications into discrete business components with well-defined interfaces, and then combine and recombine them in ways that meet your company's needs. SOA exposes business functions as services that other applications and people can use in a simple, standardized way.

MORE ON THE WEB

To learn more about Web services and how they fit into business systems, check out our Brave New Apps trilogy at www.pcmag.com/article2/0,1759,1259164,00.asp

In practice, companies need sharp technical architects who can articulate processes clearly and implement the right services in the right ways. In this primer, we give you an overview of SOA and then go inside PC Magazine Labs to show you a real-world example of its principles at work, using WebLogic Workshop from BEA to build an order-entry application.

SOA supplants old enterprise application integration (EAI) techniques with the assistance of Web services standards. These standards simplify the creation and consumption of tasks through SOAP (Simple Object Access Protocol), WSDL (Web Services Description Language), and XML

(eXtensible Markup Language). Working with standard protocols carves through much of the complexity of EAI, so companies can focus on improving their services instead of getting bogged down by integration difficulties. Web services also work better than previous approaches to help companies connect heterogeneous environments and applications.

FROM CHAOS TO CLARITY: A WORKING EXAMPLE

Most companies would describe the current state of their IT infrastructures as "in flux." Over time, companies find themselves with an assortment of applications



Case Study #1: THE LOS ANGELES TIMES

The *Los Angeles Times* gives subscribers the convenience of an Internet-based account management system that enables them to halt deliveries during their vacations, update billing and delivery addresses, request replacement copies, and review their account history. Using myEXTRA! Smart Connectors from Attachmate, the *Times* was able to integrate legacy applications residing on its IBM OS/390 mainframe. The connectors provide an easy-to-use tool for capturing transactions as callable services for reuse in application development, which is handled on the BEA WebLogic platform. The applications support the paper's 24/7 online subscriber self-service Web site.

running on a multitude of platforms, written in different languages, and accessing different data sources. Toss in a few mergers and acquisitions, and you've got a hodgepodge of redundant, overlapping apps. It stands to reason that the best way to deal with distributed, heterogeneous systems is with a distributed, service-based architecture.

Picture this: Each of the financial systems throughout your company has services named (for example) "getRevenue" and "getExpenses." You can access these each quarter to roll up all your financial data, collecting it from each source into one report. Your inventory systems would all have "getNumberInStock" services that take an item number as an input and provide a simple means to aggregate inventory data across the globe.

To connect to a system, all you do is look at its service interfaces and see what's available. If the system does not offer what you need, you build an appropriate service interface. The emphasis then changes from the applications and their often-esoteric implementation details to a set of services that any businessperson or technical staffer in the company can understand. You can now focus on what really matters most—the services provided by the system.

The business benefits of SOA are clear: Future integration is much easier and less costly, especially when compared to the complex, expensive, and lengthy EAI projects of years past. Perhaps best of all, IT managers can now run more agile businesses, by putting together combinations of services that streamline workflow and adapt to changing conditions with ease.

THE NEW WORLD ORDER

Industry analysts are quick to point out that SOA concepts have existed for a decade or longer. Indeed, some forward-

thinking companies have implemented SOA over the years, but the technologies they used were overly complex, proprietary, and customized. Many were only suited for financial services companies with plenty of money and expertise at their disposal.

Companies have used integration technologies such as CORBA, DCE, and DCOM to build service-oriented architectures, but they were only feasible for businesses with tight control over the implementations. DCE was too complex for most businesses, CORBA was too loosely defined (and vendors offered different, incompatible tools), and DCOM was Microsoft-centric.

The new, improved SOA of today places more emphasis on simple interfaces and standards and less on performance and reliability. Let's call it *standardized* SOA.

Standardized SOA is all about simple connections to services. Business analysts and developers work together to create services and interfaces that other applications can use. Developers are still integral to the process; they have to code behind the scenes to set up the implementations, but programming languages now make that easier than ever.

Business analysts, on the other hand, don't care about the details of implementation as long as it delivers operational ser-

vices effectively. This distinction is paramount to the success of SOA.

Although SOA vendors accept the separation of service interfaces from programming mechanics, other issues are not so clear-cut. For example, many companies choose to expose services through proprietary messaging middleware and associated adapters (sometimes called connectors)—such as those from Tibco Software, webMethods, or IBM's WebSphere MQ family—to achieve higher performance or quality of service than is available with SOAP and HTTP. Not surprisingly, fully standardized SOA and proprietary SOA solutions represent trade-offs among efficiency, quality of service, cost, and complexity.

The SOAs under development in businesses today are trending toward loosely coupled services and simplicity at the integration layer. Businesses then augment security, reliability, and quality of service as necessary. For now, simplicity reigns supreme.

THE KILLER APPS

SOA has three practical applications that can provide immediate returns for most companies.

- **Enterprise application integration.** EAI is the most obvious place to save money using an SOA. This dirty back-end work costs midsize and Global 2000 companies millions of dollars each year. Although it is difficult to connect some legacy applications, Web services and SOAs in general lower integration costs across the board.

Many enterprise application vendors have begun adding Web service interfaces into their products, so where these interfaces exist, the integration comes free. Other popular apps offer application programming interfaces (APIs) that can be wrapped in Web services easily.

Many legacy applications and even



Case Study #2: OHIO STATE UNIVERSITY MEDICAL CENTER

OR-Eye, developed by the Ohio State University Medical Center, lets authorized users monitor, record, and replay vital-signs data generated in operating rooms and intensive-care units. The solution extracts data from a proprietary monitor network and uses Web service protocols provided by Web Services Enhancements 2.0 for Microsoft .NET to expose the information for secure access by smart client apps. OR-Eye is delivering better clinical data, broader access, greater operational efficiency, and improved tracking of patients' vital signs and coordination of their medications.

some newer ones have no defined entry points, though—neither via Web services nor through serviceable APIs. In these cases, Web service creation is as costly as traditional EAI work. Still, once the Web service is defined, the services can be used in a standardized way by other applications, a clear benefit over one-off EAI projects.

• **Business Process Management (BPM).** Business processes are the key to an SOA's long-term success and provide the greatest top-line value. BPM answers the question, "What can you do with a set of services?" Services do not manage themselves and run your business. Businesspeople need to decide how to use services to meet customer needs, fill orders, collect receivables, and dream up new products. Companies can better attain SOA's full promised value of when they choreograph workflows into business processes.

So is BPM part of an SOA? Some experts claim that the two are inextricably linked; others say BPM is a separate but critical part of the process. We believe BPM, whether you include it or separate it from

your SOA, is the real tie between business and services and a necessary part of any successful initiative.

• **Composite applications.** Many analysts and vendors contend that SOA-based systems will really be successful only when they enable employees to work faster and more efficiently using desktop applications filled with useful services. These so-called composite applications (a.k.a. *front-end integration*) do not have the clear savings of EAI nor the high-level impact of BPM, but they offer the potential for far better visibility into business processes and services, and that invariably leads to better decision making.

Composite applications come in the form of Web-based, rich-client interfaces for desktops and mobile devices. Corporate portals have long been magnets for composite applications. New standards such as Web Services for Remote Portlets (WSRP) will standardize how Web services are woven into portals. Field workers can, for example, use a composite application to access product information from one database, process an order through another interface, and

update the billing department through yet another—all within the same program or portal.

Microsoft, Macromedia, and others are creating the framework for incorporating services into their own applications. Microsoft is focusing on Windows and its Microsoft Office suite; its Information Bridge Framework for Microsoft Office shows how Office applications will incorporate Web services directly into the interface. Macromedia envisions a future where Web service consumption is incorporated into its industry-leading Flash software and ActionScript language.

Other companies, including Above All, BEA, and IBM, are addressing composite applications by giving developers tools and products to build them from existing resources.

MYTHS, CHALLENGES, AND CONTROVERSIES

Anyone serious about implementing SOA needs to know the pitfalls and how to avoid them. Refer to this section when you get that nagging feeling that someone is overselling SOA's virtues.

OUR CONTRIBUTORS: Rob Lipschutz is president of Thing 7 (www.thing7.com), a technology consulting firm. Executive editor Carol Levin, PC Magazine Labs lead analyst Sahil Gambhir, and associate editor Michael J. Steinhart were in charge of this story.

Inside PC Labs: Getting Started with SOA

We put BEA WebLogic Workshop to the e-commerce test, integrating a Web store with a back-end SAP database. SOA requires new skills, but the technology works.

To demonstrate how to build a service-oriented architecture project, we designed an order-entry processing application for a Web store. We used BEA WebLogic Workshop, a leading integrated development environment, to create a composite Java

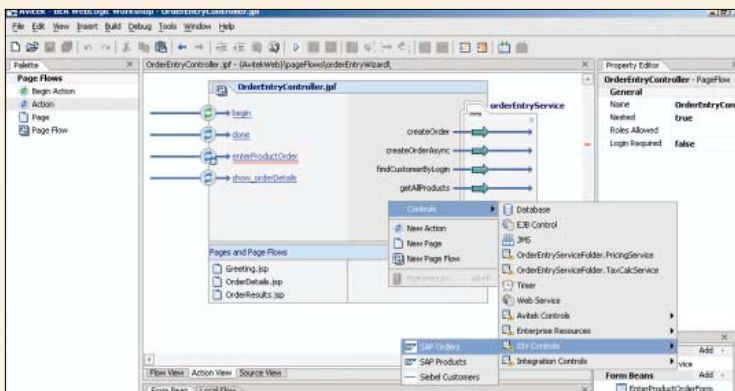
application that delivers several services. Specifically, we wanted it to retrieve inventory data from a SAP database system, process the transaction, and update the database. We also wanted it to calculate the tax on customer orders and complete the transactions. We did this by incorporating a tax-calculator Web service. In the end, our application processed customer orders quickly and efficiently.

The beauty of SOA is that we didn't have to become SAP experts to build our application. WebLogic Workshop hides

such tasks as looking up JavaBean references. It also makes SOAP calls that would otherwise require knowledge of complex J2EE APIs. And we did not have to write WSDL and SOAP calls to the tax-calculator Web service manually. Instead, we used a WebLogic Workshop wizard to exchange parameters with SAP and the tax calculator.

Our application implements the basic tenets of SOA, known as *loose coupling* and *asynchrony* (more on these later). Workshop helps put these concepts to work for business.

BEA designed Workshop in a way that abstracts the low-level programming from the developer, using a visual design model called Java Page Flow, which enables architects and developers to design and implement Web applications. First, we used the visual tool to map out the processes needed. Then, we began



IN BEA WEBLOGIC WORKSHOP'S Action View, developers can drop an out-of-box ISV control to connect and bind to an SAP system.

• **Many moving parts.** People often use a manufacturing analogy to describe SOA: An automobile factory assembles a car from components that have been created elsewhere. But in electronics and traditional manufacturing, designers and engineers attempt to minimize the number of moving parts. Every moving part can wear out, jam, or break, and you can often correlate the mean time between failures to the number of moving parts.

SOA is all about moving parts, and if an application depends on a set of distributed services, it can be compromised if any one of the services goes down. This raises the question of how services are maintained and upgraded. Companies that can help in this area are Actional, AmberPoint, and Infravio. (For more information, see the vendor table.)

• **Build it and they will come.** In the hands of gung-ho technologists, SOA can lead to a lot of work and little value. A successful SOA project needs management buy-in and plenty of thought about the business processes sitting above the services.

• **Faster and less expensive development.** This is a myth, looking at the short term. Although you can save some time on the integration side, the complexity inherent in combining multiple services into a



Case Study #3: WACHOVIA CORP.

Wachovia buys market data from 130 sources and then distributes it to a staff of over 200 brokers, who analyze the market and make investment recommendations. Each relationship requires a customized communications solution that offers limited visibility into the data sources. Through Grand Central's Business Services Network, XML data feeds are plugged directly into Wachovia's equity intranet application and delivered to brokers' desktops. Grand Central translates data formats from multiple vendors into any XML format Wachovia needs, requiring only one connection from Wachovia to Grand Central.

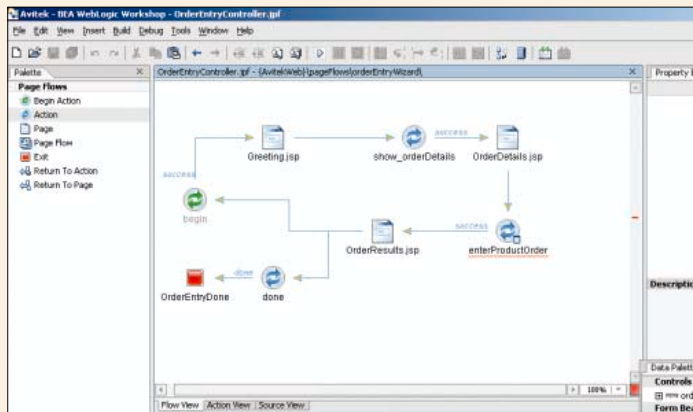
meaningful application will offset that savings. Building applications from component services requires time and expertise. Companies need sharp—and usually expensive—analysts and consultants to help make important decisions. Most developers in the initial stages of SOA-building are not sure how to expose services with the right level of granularity.

A company's first integration of a legacy system will be equally difficult with or without Web services. If Web services are already in place, they may not be exactly what you need. SOA provides more agility than traditional closed architectures, but the increased costs of de-

signing and developing the new distributed systems may eat up the savings from reduced integration costs. In the long run, however, SOA should lead to significant savings and newfound agility.

• **Quality of service.** SOA does not address quality of service, an important aspect of any business system. There are two problems: The standards for security, reliability, and transactions are still immature, and quality of service depends strongly on how SOA is implemented.

These problems are well known. Much of today's work in the SOA standards community revolves around improving these areas. Companies and vendors need to be



BUSINESS ANALYSTS can design the navigational flow of an SOA's JavaServer Pages in BEA WebLogic Workshop's Flow View.

by using drag-and-drop icons to create a navigational page flow that defined the basic relationships among JavaServer Pages, while separating the interface code from the business logic. In addition to the Flow View, Workshop presents two additional view options (see the screenshots). Action View presents code elements as symbols. Here, we added the necessary method calls.

From the Action View, we also added a control to an SAP resource. Controls treat resources as Java objects. As these objects are automatically wrapped with Web services in Workshop, binding back-end data to an application is a much simpler task than usual.

This control automatically exposed several sets of operations that we could use to connect to the SAP system. This enabled us to create an application with independent components. The SOA principle of loose coupling is advanced by using controls that automatically handle the logic between resource and requestor, so the developer doesn't even have to know how each piece connects with the others.

Next, we wanted to connect to a Web service. From a tool palette (see the screenshot), we dropped a Web service control into the designer, named the variables, and browsed to the appropriate WSDL file on our network.

One of the fundamental challenges in any SOA is *asynchrony*. An application does not know exactly when a remote system will reply to the requesting agent. But by simply dragging a method icon from the palette window and setting a "message-buffer=true" option in the property editor for that control, and then adding another callback method whose function is to notify the

calling client when the result of the call is ready, we were able to create simple asynchronous calls. Through this uncomplicated mechanism, Workshop orchestrates a business transaction without relying on the developer to know details about specific J2EE domains such as EJB, JMS, JCA, and JNDI.

It's clear that SOA requires a new skill set, but the benefits—programmatic efficiency, the ability to reuse applications, and easier application integration—are well worth the work. And though Workshop is not entirely code-free, it offers a first-rate visual SOA development tool.—*Sahil Gambhir*

Who's Who in the SOA World

Building a service-oriented architecture is a complex task, and dozens of companies are ready to help. We've broken down this list of major players by which role they fill in the SOA ecosystem.

Company Name	Product Name	Web Site
SOA DEVELOPMENT TOOLS		
Above All Software	Above All Studio	www.aboveallsoftware.com
BEA Systems	WebLogic Workshop 8.1	www.bea.com
Cape Clear Software	Cape Clear Studio	www.capeclear.com
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Sun Microsystems	Java Studio Creator	http://java.sun.com
Systinet Corp.	Systinet Developer, Systinet Server (formerly WASP Developer, WASP Server)	www.systinet.com
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webMethods	webMethods Glue (formerly Mind Electric GLUE)	www.webmethods.com
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Blue Titan Software	Network Director 2.5	www.bluetitan.com
Digital Evolution	Digital Evolution Service Manager 2.3.2	www.digev.com
Flamenco Networks	Flamenco WSM	www.flamenconetworks.com
Forum Systems	Forum Sentry	www.forumsys.com
Grand Central Communications	Business Services Network (formerly Web Services Network)	www.grandcentral.com
Infravio	Infravio Ensemble	www.infravio.com
Oblix	Oblix COREsv version 4.0	www.oblix.com
Reactivity	Reactivity Management Console	www.reactivity.com
Systinet Corp.	Systinet UDDI Registry 5.0 (formerly WASP UDDI)	www.systinet.com
Westbridge Technology	XML Message Server (XMS)	www.westbridgetech.com
WEB SERVICES ASSEMBLY, WEB SERVICES CONSUMPTION, WEB SERVICES ORCHESTRATION		
Bowstreet	Bowstreet Factory 5.7	www.bowstreet.com
Kenamea	Kenamea Composite Application Suite	www.kenamea.com
Oracle (acquired Collaxa)	Oracle BPEL Process Manager (replaced Collaxa 2)	www.collaxa.com
RatchetSoft	Ratchet-X	www.ratchetsoft.com
BUSINESS PROCESS MANAGEMENT/INTEGRATION TOOLS		
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IBM	WebSphere Business Integration Server Version 4.2.2	www.ibm.com
Magic Software	iBOLT Integration Suite	www.magicsoftware.com
Microsoft Corp.	BizTalk Server 2004	www.microsoft.com

careful not to slip back into proprietary and complex mechanisms that could defeat the gains made by Web services.

Even when standards do emerge, they will focus only on the design of the architectures; companies must still create stable models on their own (platforms, network, and security) that implement those standards. Don't make the mistake of thinking that having a great architecture on paper is enough.

Once again, vendors are there to meet this need, selling integration servers that reintroduce quality of service, management, brokering software, and even network services. Grand Central, for example, lets you take advantage of the quality of service it has built into its network.

• **Application support.** Most application vendors have announced some support

for Web services, but the extent of that support is often vague. When you are embarking on a project, promises of future features are worthless. When you assess the feasibility of any project, application support should be a key factor. Companies serious about SOA should put a very high value on the services exposed by their chosen enterprise applications, not just on the functionality contained within those applications.

For example, if your ERP system works great when accessed using its own client software, but won't give up financial information to other applications via Web services, you are trapped inside that system and bound to its vagaries. If you are really serious about SOA, functionality that is not available outside its parent application has little value. Make sure

your application partners understand how important this is to you.

TAKING THE LEAP

SOA is best understood as a survival reaction to the high-priced, monolithic applications that have caused so much pain for IT departments. With this in mind, you can get your feet wet by experimenting with an SOA at the project level—say, to streamline inventory tracking in one department—and see immediate benefits. After a few successful projects, your enterprise will appreciate firsthand the benefits and challenges of service-oriented architecture. With a fully connected SOA system linking your business with suppliers, partners, and customers, your IT infrastructure can adapt along with your growing company. ☰

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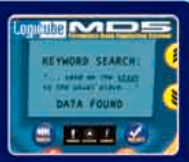


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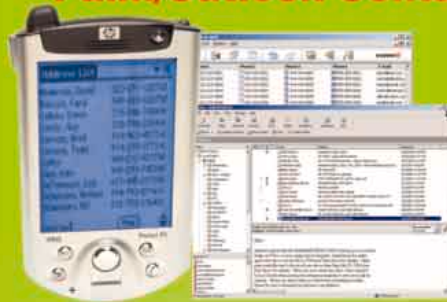
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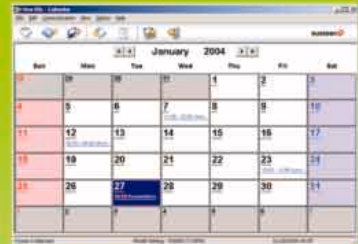
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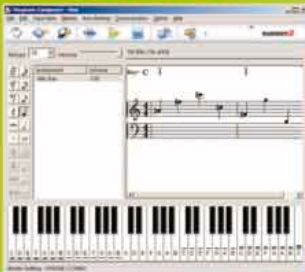
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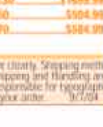
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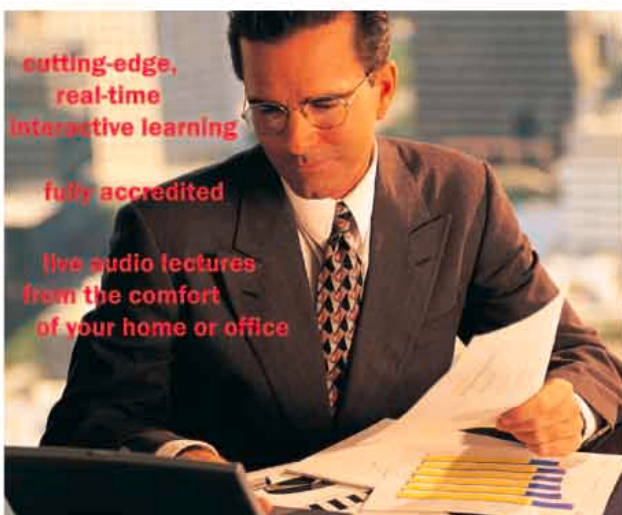


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"I collect timepieces. When I received my Steinhausen, I knew from the look, feel, and quality of the watch that this would be one of my favorites. I have spent thousands of dollars for inferior watches. It will be my gift of choice this holiday season."
Sol S., Mt. Vernon, NY

So rare that only a handful were made in 1923

In 1923, a Swiss watchmaker crafted the most advanced watch of its time. After 80 years, the Steinhausen watch has finally been "reborn," preserving its mastery of technology and classic design. Once only displayed in high priced collections, this rare timepiece from history can now be yours.

Step back in time to Steinhausen, Switzerland circa 1923. A master watchmaker works for months, trying to create the world's most perfect watch. Finally he succeeds—the first of its kind to display the date, day and month, and the only one to designate AM/PM.

Collectors Pay Thousands \$\$\$\$

He makes a limited number of these distinctive handmade timepieces, which eventually find their way onto the wrists of only the world's most distinguished gentry. Today, collectors are willing to pay thousands of dollars to add one of these original Steinhausen masterpieces to their own collection.

Reborn After 80 Years

Until now, that was the only way you could own a Steinhausen, still one of the world's rarest and most prized wristwatches. But for the first time in 80 years, the original Steinhausen masterpiece is now being painstakingly reproduced for modern day collectors. Still manufactured by hand, this 21st-century reproduction carries the same graceful styling and features as the original. The scratch-resistant crystal comfortably rests in a surgical grade stainless steel case and bezel, which provides the ultimate in precision and protection.

Powered by You

This handsome timepiece has been updated with a kinetic automatic movement that is powered by the motion of the wearer's arm, so the watch never needs winding or batteries.

Hand-crafted Elite Movement

The Steinhausen movement consists of 185 parts, that are assembled entirely by hand. To prevent wear on gears, fine watches use tiny gemstones to reduce friction. The Steinhausen features up to 35 jewels, 15 more than most of the worlds elite watches. The movement is then rigorously tested for flaws and accuracy. Only 6% of the movements made ever meet the stringent requirements to be placed in this noble timepiece, making the Steinhausen one of the most accurate in the world.

Adapted from Swiss Technology

A Swiss engineered movement comparable to the Steinhausen has never been produced at this low price. Each watch comes housed in a handsome storage case and includes two interchangeable leather wristbands in black and brown.

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THE HISTORY OF WATCH MAKING

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1868	Patek Philippe makes first wrist watch	1923	Lips produced the first battery powered watch
	1923	1953	2003
	1st Automatic movement in a wrist watch		Steinhausen masterpiece is reproduced for first time

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Slide Show & Tell

BY JAN OZER

There's no better way to display your digital pictures than on a big-screen monitor or television, and no better way to engage your audience than with a slide show set to music, with fun transitions and effects. We reviewed these five programs by assessing their slide show creation capabilities, along with useful features such as image editing, and found several fabulous options. In the case of Ulead's PictureShow, the only one with the ability to print DVD labels, case covers, and liner notes, we tested that feature too, on an Epson Stylus Photo R200.



ARCISOFT DVD SLIDESHOW 1.0



ArcSoft DVD SlideShow 1.0

ArcSoft DVD SlideShow offers an excellent blend of ease of use, quality, and functionality. Though we encountered some feature gaps and minor irritations, DVD SlideShow is our first choice for producing slide shows on DVD.

SlideShow's design area is built around the DVD menu. You direct your workflow with buttons at the top of the menu and add content via buttons on the right, an instantly understandable approach. Pan-and-zoom features are the best among the reviewed products; the ability to

rotate images and apply an effect for a portion of the slide's duration is unique.

Image-editing tools are modest. You can crop the image to fit a TV screen, a feature we like, and brightness controls work well. But red-eye reduction and color correction aren't included, so if your images need

tweaking, you'll have to use a separate image editor.

The program's audio capabilities are generally fine. You can import multiple WAV, MP3, and WMA files into each slide show, and auto-fit slide duration to song duration. But the narration feature lacks volume control and feedback, making high-quality narration a hit-or-miss proposition.

Menu design is straightforward, with the best themes in the roundup and layout and background customizability. Though transitions and pan-and-zoom effects were choppy during preview, playback from the finished DVD was very smooth.

\$49.99 list. ArcSoft Inc., www.arcsoft.com.



MemoriesOnTV

MemoriesOnTV is about one interface redesign away from being top-notch. For now, ArcSoft DVD SlideShow 1.0 offers similar functionality and is much easier to use.

In Memories, you use a Windows Explorer-like interface to build DVDs. You have to click on a tab called Add Album, instead of something obvious like Add Slide Show or Add Video File, which is confusing. The program offers no color correction, brightness correction, or red-eye reduction, so you'll need a separate image editor.

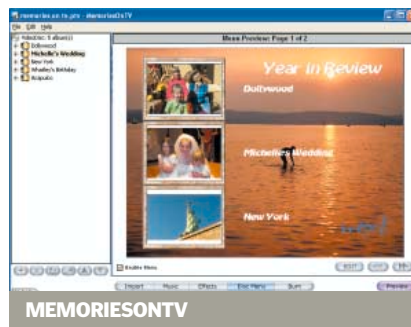
Though there are pan-and-zoom controls, they are not as intuitive as those in the ArcSoft product; for example, you can't pre-

view the effect from the control window. Ditto for transitions applied to your images, which you can preview when they're applied to the entire slide show but not when you select them for individual images.

Audio capabilities are a bright spot. You can import multiple background music tracks for a slide show, which will play sequentially, and you can sync slide duration to background music. You can also fade audio in and out, add background music to video files, and adjust the volume of both the video and inserted music.

The program's menu templates, however, were far less elegant and customizable than those in DVD SlideShow. Encoding controls were unintuitive, with never-before-seen settings (such as the TV Safe region percentage). And using the default encoding controls produced a warbling effect on our MP3 audio files, which we eliminated by switching to LPCM audio.

\$49.95 direct (with MPEG-2 plug-in required for DVD). PictureToTV.com Pte Ltd., www.memoriesontv.com.



MEMORIESONTV

Microsoft Plus! Photo Story 2

Microsoft Plus! PhotoStory 2 is like a laser beam focused on one simple task—producing a slide show to watch on your computer or TV from one set of images, with narration, pan-and-zoom effects, and background audio. If this is your goal, it's a first-rate choice; if you need other options, look elsewhere.

Photo Story is a component of the Microsoft Plus! Digital Media Edition and is completely wizard driven, so usability is excellent. Start by selecting your images, which you can organize in a storyboard with automatically applied or manual panning and zooming. You can add back-

WHAT THE RATINGS MEAN

- EXCELLENT
- VERY GOOD
- GOOD
- FAIR
- POOR

ground music as well as narration to any slide in the story. Uniquely, Photo Story offers a microphone-tuning wizard, making narration truly workable.

When you narrate an image, Photo Story displays the file for the duration of the narration; otherwise, you can specify a duration. But Photo Story can't automatically synchronize slide duration with the background music. Text options are limited to an opening title, and Photo Story automatically inserts a dissolve transition between all slides; no others are available.

After you preview your slide show, Photo Story outputs a Windows Media Video (WMV) file in either high-quality (640-by-480) or low-quality (320-by-240) resolution. Once it's produced, you can burn the video file, along with project and picture files, onto a Video CD for viewing on most DVD players.

\$19.95 list (as a component of Plus! Digital Media Edition). Microsoft Corp., www.microsoft.com/windows/plus/dme/Photo.asp. ●●●●○



Nero PhotoShow Elite

Nero PhotoShow Elite, from Ahead Software, can build wonderful theme-based slide shows and edit your images. It also offers the most diverse options for distributing your images, including photo mugs and calendars. But its other slide show capabilities are limited, as is its ability to produce discs that play on DVD players.

Building a theme-based presentation is a snap: Simply select the images and choose a style (such as Birthday or Old Movie), and PhotoShow adds background images, music, transitions, and effects. The process takes only seconds. PhotoShow provides extensive image-editing options too, including red-eye reduction, and a great range of effects, such as text messages in thought bubbles, spoken words, and libraries of fun clip-art effects.

You can also upload pictures to a Web site and e-mail invitations for others to view the images at www.simplestar.com for fast, low-hassle sharing. In addition, if



NERO PHOTOSHOW ELITE

you're a Snapfish or Shutterfly user, you'll appreciate the ability to upload images after editing to either service.

Unfortunately, if your goal is creating discs to play on a DVD player (either DVDs or Video CDs), your options are limited. The program can't produce DVD or even Video CD titles with audio, a frustrating limitation. And even when creating slide shows for computer-based playback, you can't sync slide duration to background music or add pan-and-zoom effects.

\$49 list. Ahead Software, www.nerophotoshow.com. ●●●●○

Ulead DVD PictureShow 2

If image-editing power is first on your wish list, Ulead DVD PictureShow is for you. And although the program lacks several key features, it has a unique music capability that makes it worth a look for those producing slide shows on DVDs.

Bundled with PictureShow is Ulead's Photo Explorer, which includes excellent red-eye reduction and color and brightness controls. The best way to organize your workflow is to prepare your images in Photo Explorer and then build your slide shows in PictureShow. You can then output multiple slide shows and video files to

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Video CD, Super Video CD, or DVD.

The program's operation is wizard driven and simple to use, but it lacks pan-and-zoom effects and can't synchronize slide show duration to background audio. But PictureShow can add music to individual slides, so you can change songs mid-slide show, with a cross-fade to smooth the transition. Very cool.

PictureShow offers a fine selection of menus for the DVD interface, but customization is limited to changing background images and inserting a background audio file. We like the ability to store files as data files on the DVD, which makes printing easier. PictureShow is the only



program we review here that can print CD labels and inserts, but since it has no template for the Epson Stylus Photo R200 we used in testing, we couldn't print labels directly onto our DVDs.

\$49.95 direct. Ulead Systems Inc., www.ulead.com. ●●●●○

THE FINAL TOUCH

After you've edited your favorite images, chosen background music, created a slide show, and burned it onto a CD or DVD, labeling the disc and case with a permanent marker just isn't good enough. And although paper labels work well with CDs, they can cause playability problems with some DVDs.

Fortunately, printing directly onto CD and DVD media is now very affordable. For example, the Epson Stylus Photo R200 (\$99 direct) printed beautiful smudge-free discs on Maxell, Ridata, and Verbatim media. Some software, such as Ulead's PictureShow, can print inserts; otherwise you'll need a program like MicroVision Development's SureThing CD/DVD Labeler (\$29.95 direct).



MicroVision Development's SureThing CD/DVD Labeler (\$29.95 direct).

GEAR + GAMES

Not-So-Modest Mouse

The Microsoft Starck Optical Mouse is the eye-pleasing creation of French designer Philippe Starck. The flashy mouse looks like the virtual cars in *Tron*: sleek and built for speed. But appearance isn't everything. Such a futuristic-looking mouse should be wireless. And while the buttons look cool, they extend the length of the device—a problem if your hand rests perpetually on your mouse. Be ready to endure constant accidental clicking if you don't treat the mouse gingerly. Your eyes might love it, but your hand sure won't.—*Kyle Monson*

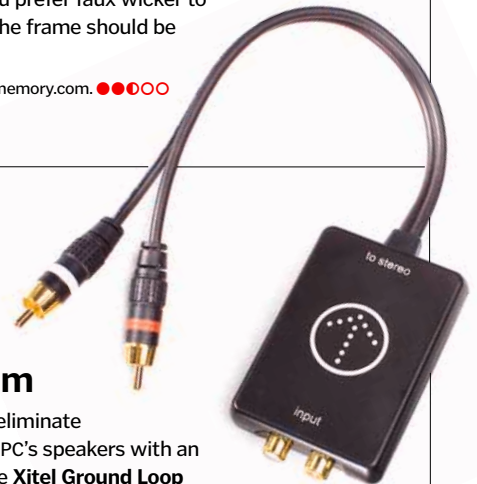
\$34.95 list. Microsoft Corp., www.microsoft.com.



Frame Your Shots

Need some high-tech decor? Check out the **PQI Intelligent Frame**, with a 5.6-inch LCD screen and 32MB of flash memory. Load photos and slide shows to your PC using almost any type of flash card or a USB connection. The frame comes with slide show options that include transition effects, frame speed, and volume control for external speakers; it also reads Motion JPEG files. Brightness control keeps the picture quality tolerable. Included is a CD with 17 printable bezel frames, in case you prefer faux wicker to faux oak. But for \$279, the frame should be mahogany.—*KM*

\$279 list. PQI Corp., www.pqimemory.com. ●●●○○



Rattle, No Hum

You can probably eliminate that hum in your PC's speakers with an accessory like the **Xitel Ground Loop Isolator**

, which breaks the grounding between your computer and your audio equipment without cutting out the audio signal. The well-made, palm-size device connects your PC's audio output jack and your powered speakers. Though the Ground Loop Isolator won't do anything about a hum caused by loose or aging cables, Xitel still refunds your money if your hum doesn't fade.—*Bill Howard*

\$34.95 list. Xitel LLC, www.xiteldirect.com. ●●●○○

FlipAlbum Flop

A good idea gone wrong, the **FlipAlbum Recorder** makes digital photo albums and burns JPEGs from memory cards directly onto CDs—or it's supposed to. Nothing on this machine works the way it should. The unit habitually conks out, the remote is fussy, and the interface is counterintuitive. Photo-album quality just isn't worth the trouble.—*KM*

\$249 direct. E-Book Systems Inc., www.flipalbum.com. ●○○○○



Step Up to the Plate

BY MATTHEW D. SARREL

You can't always pull 18 friends together for an impromptu baseball game. So bring the action inside, with this year's better-than-ever console baseball games. All the games we reviewed are contenders, but some provide a more immersive, realistic experience and are easier to play. And online capability means you won't have to play alone.

All-Star Baseball 2005

An innovative "cam" provides a third-person view from behind the fielder as he makes a play, so you can gauge the distance and height of the ball. Four batting options include a 3D setting, giving you precision aiming. Graphics aren't terrific: The players look like cardboard cutouts, and the ball sometimes disappeared when it neared the glove. Repetitive animations and commentary don't add much to the game. For Sony PlayStation 2 and Microsoft Xbox (tested).

\$50 street. Acclaim Entertainment Inc., www.acclaim.com. ●●●○○



ESPN Major League Baseball 2K4

In Gamecast mode, you can set up a situation (such as man on first, two out, your team losing by 1) and play it out. Stadiums, players, and sound effects are realistic. Batting, pitching, and fielding controls are easy to learn and work well. But automatic fielder control was inaccurate, and we were baffled when instant replay showed something different from what had occurred (a runner was called out, but replay showed him sliding into second base). For PlayStation 2 and Xbox (tested).

\$19.99 direct. ESPN Videogames, www.espnvideogames.com. ●●●○○

MLB 2005

The Rookie level makes this game very easy to play. So does voice recognition, which lets you speak commands such as "infield double play" and "pick first." With the game's Sony EyeToy functionality, you can create a player who has your face and play alongside baseball stars. Fielding controls are excellent; pitching and hitting

controls are standard. Player animations, including signature moves, are both smooth and appropriate. Unfortunately, the characters look flat compared with those in MVP Baseball. For PlayStation 2.

\$49.99 list. 989 Sports, www.989sports.com. ●●●○○

MLB SlugFest: Loaded

Midway's irreverent take on baseball returns, with new MLB Classic and Deep Franchise modes, courtesy of the newly licensed Baseball Mogul engine. Although Classic mode offers little more than the other games we reviewed, SlugFest mode is hilarious fun (especially in multiplayer matches) and includes spectacular animations, such as a fiery bat dinging a smoking ball. And in Home Run Derby mode, you can easily start walloping homer after homer. For PlayStation 2 (tested) and Xbox.

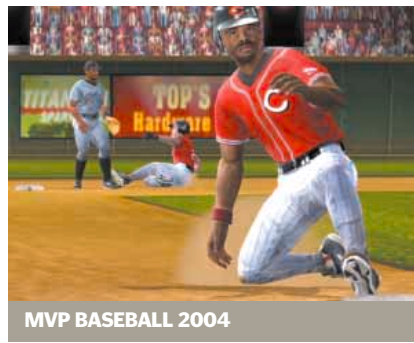
\$50 street. Midway Amusement Games LLC, www.midwaygames.com. ●●●○○

MVP Baseball 2004



With realistic stadiums, accurate player models, enhanced animations, and a comprehensive Dynasty mode (including team training), this game will please any aspiring ball-club owner. You can control swing types and angles using an improved hitting system. A variable-size indicator shows you where the ball will land, and right-thumbstick controls like Dive and Jump make sure you get there to catch it. The default method of clicking three times to throw is a distracting hassle, but you can turn it off. For Nintendo GameCube, PC, PlayStation 2, and Xbox (tested).

\$49.99 list. Electronic Arts Inc., www.easports.com. ●●●○○



QUICK CLIPS



Harry Potter and the Prisoner of Azkaban

The new Harry Potter game echoes the darker tone of the film (and book) it's based on. Learn spells, solve puzzles, and fight monsters in sequences all but young gamers might find too easy. The game combines an over-the-shoulder view of Harry, Ron, or Hermione with first-person controls—a nice plus. And it offers a break from the linear nature of many movie tie-ins; you can take on side quests like collecting Cauldron Cakes and Wizard cards.—*Dan Ackerman*

\$29.95 list. Electronic Arts Inc., www.ea.com. ●●●○○

True Crime: Streets of LA

True Crime is reminiscent of the Grand Theft Auto series, with its highly detailed cityscape and focus on driving—but here players stop crimes instead of committing them. Some actors and rappers lend their talents to True Crime; this feature, combined with the immersive graphics and adult language, makes the game feel a little like a movie.—*John Blazevic*

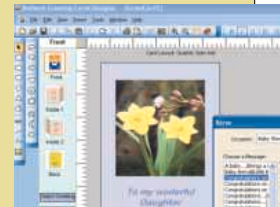
\$39.99 list. Activision Inc., www.truecrimela.com. ●●●○○



Belltech Greeting Cards Designer 1.2

Belltech Greeting Cards Designer 1.2 lets you create personalized greeting cards with templates or your own custom designs. The interface is simple, and the templates are attractive, with quality photos and hundreds of greetings. You can design all four pages of a card, including the inside cover and back. Unfortunately, some editing limitations mark this as a first-generation program.—*Sally Wiener Grotta*

\$29.95 list. Belltech Systems LLC, www.belltechsystems.com. ●●●○○





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Edited by Don Willmott

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<< Kinda makes you wonder what exactly this software is capable of. (PowerMenu site)



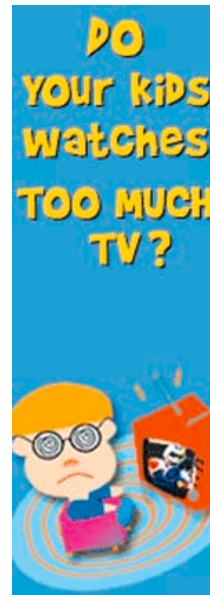
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<< You'll probably want a new computer by then anyway. (InfoTel Distributors site)



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<< What is this? Reverse psychology? (CNET.com review)

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- Sound Blaster® Audigy™ 2 (D) Sound Card
- Dell 5650 5.1 Surround Sound Speaker System with Subwoofer
- Productivity Pack including WordPerfect® 12 and Microsoft® Money 2004 Standard
- 6 Months of America Online® Membership Included¹
- 1-Yr Limited Warranty¹; 1-Yr At-Home Service¹

\$1499 or as low as **\$45/mo¹**
E-VALUE Code: 01282-D50814

NEW INSPIRON™ 1000 NOTEBOOK

Value Solution

- Mobile Intel® Celeron® Processor at 2.20GHz
- Microsoft® Windows® XP Home Edition
- 14.1" XGA TFT Display
- 256MB Shared® DDR SDRAM
- 30GB Hard Drive
- 24x CD Burner/DVD Combo Drive
- Integrated Graphics
- Productivity Pack including WordPerfect® and Microsoft® Money 2004 Standard
- 90-Day Limited Warranty¹; 90-Day Mail-In Service

\$799 or as low as **\$24/mo¹**
E-VALUE Code: 01282-D80807m

Recommended Upgrades:

- Dell™ 1300 Wireless PC Card (802.11b/g), add \$39
- 3-Yr Limited Warranty¹; 3-Yr Mail-In Service, add \$119

INSPIRON™ 5150 NOTEBOOK

Perfect Balance of Price and Performance

- Mobile Intel® Pentium® 4 Processor with HT Technology at 2.80GHz¹
- Microsoft® Windows® XP Home Edition
- 15" XGA TFT Display
- 512MB DDR SDRAM
- 30GB Hard Drive
- 24x CD Burner/DVD Combo Drive
- 32MB DDR NVIDIA® GeForceFX™ Go5200 AGP 4X Graphics
- Dell™ 1350 Internal Wireless Card (802.11b/g)
- Productivity Pack 12 including WordPerfect® and Microsoft® Money 2004 Standard
- 1-Yr Limited Warranty¹; 1-Yr Mail-In Service

\$1349 or as low as **\$41/mo¹**
E-VALUE Code: 01282-D80813m

Make this your perfect PC:

- 40GB Hard Drive, add \$59
- 3-Yr Limited Warranty¹; 3-Yr At-Home Service¹; add \$269

INSPIRON™ 8600 NOTEBOOK

Power on the Go

- Intel® Centrino® Mobile Technology - Intel® Pentium® M Processor 705 (1.50GHz, 1MB Cache, 400MHz FSB)
- Intel® PRO Wireless 2200 Internal Wireless Card (802.11b/g)
- Microsoft® Windows® XP Home Edition
- 15.4" UltraSharp® Wide Screen XGA TFT Display
- 512MB DDR SDRAM
- 60GB Hard Drive
- 24x CD Burner/DVD Combo Drive
- 32MB DDR NVIDIA® GeForce™ FX Go5200 AGP 4X Graphics
- Productivity Pack 12 including WordPerfect® and Microsoft® Money 2004 Standard
- 1-Yr Limited Warranty¹; 1-Yr Mail-In Service

\$1649 or as low as **\$50/mo¹**
E-VALUE Code: 01282-D80816m

Make this your perfect PC:

- 4x CD/DVD Burner (DVD+RW/+R¹), add \$150
- 3-Yr Limited Warranty¹; 3-Yr At-Home Service¹; add \$269



Small Business Desktops

DIMENSION™ 2400 DESKTOP

Economical, Essential Technology Desktop

- Intel® Celeron® Processor (2.40GHz, 256K L2 Cache, with 400MHz FSB)
- Microsoft® Windows® XP Home Edition
- WordPerfect® Word Processing Software
- 128MB Shared® DDR SDRAM
- 40GB Hard Drive (7200 RPM)
- Integrated Intel® 3D Extreme Graphics
- 48x CD-ROM, Integrated Audio
- Integrated 10/100 Ethernet
- 90-Day Limited Warranty; 90-Day On-Site Service*
- Monitor Not Included

\$349 E-VALUE Code: 01282-S50803y

Recommended Upgrades:

- NEW WordPerfect® Office 12, add \$49
- 17" (16.0" v.l.s.) E773 Monitor, add \$100

NEW OPTIPLEX™ 170L DESKTOP

Network-Optimized, Value Business Desktop

- Intel® Pentium® 4 Processor (2.80GHz, 1MB L2 Cache, 800MHz FSB)
- Microsoft® Windows® XP Professional
- 256MB Shared® DDR SDRAM
- 40GB Hard Drive (7200 RPM)
- Integrated Intel® Extreme Graphics 2
- 48x CD-ROM
- Integrated 10/100 Ethernet
- 3-Yr Next Business Day On-Site Service*
- Monitor Not Included

\$749 Lease as low as \$20/mo., (48 prmts.)*
E-VALUE Code: 01282-S30807y

Recommended Upgrades:

- 512MB Shared® DDR SDRAM, add \$55
- Microsoft® Office Basic Edition 2003, add \$119
- 17" Dell™ UltraSharp™ 1703FP Digital Flat Panel, add \$529

NEW DIMENSION™ 4700 DESKTOP

Exceptional Performance Desktop

- Intel® Pentium® 4 Processor 520 (2.80GHz, 1MB L2 Cache, 800MHz FSB)
- Microsoft® Windows® XP Home Edition
- WordPerfect® Word Processing Software
- 512MB Dual-Channel Shared® DDR2 SDRAM
- 40GB SATA Hard Drive (7200 RPM)
- Integrated Intel® Graphics Media Accelerator 800
- 48x CD Burner/DVD Combo Drive; Integrated Audio
- Integrated Intel® PRO 10/100 Ethernet
- 1-Yr Limited Warranty; 1-Yr On-Site Service*
- Monitor Not Included

\$899 Lease as low as \$24/mo., (48 prmts.)*
E-VALUE Code: 01282-S50808y

Recommended Upgrades:

- NEW WordPerfect® Office 12, add \$49
- Dell™ All-In-One Printer A960, add \$179



Small Business Notebooks

LATITUDE™ D505 NOTEBOOK

Essential Productivity and Value – Starting at 5.1 lbs.*

- Intel® Celeron® M Processor 330 (1.40GHz, 512KB L2 Cache, 400MHz FSB)
- Microsoft® Windows® XP Home Edition
- 14.1" XGA TFT Display
- 128MB Shared® DDR SDRAM
- 20GB Hard Drive
- Modular 24x CD-ROM Drive
- Intel® PROWireless 2100 802.11b Mbps® Mini-PCI Wireless Card
- Integrated Intel® Extreme Graphics
- 1-Yr Mail-In Service; Serial and Parallel Ports Included

\$1049 Lease as low as \$28/mo., (48 prmts.)*
E-VALUE Code: 01282-S70810m

Recommended Upgrade:

- Additional Primary Battery (6-Cell), add \$99

INSPIRON™ 8600 NOTEBOOK

Power on the Go – Starting at 6.9 lbs.*

- Featuring Intel® Centrino™ mobile technology
- Intel® Pentium® M Processor 705 (1.50GHz, 1MB L2 Cache, 400MHz FSB)
- Intel® PROWireless 2100 802.11b 11Mbps® Mini-PCI Wireless Card
- Microsoft® Windows® XP Home Edition
- WordPerfect® Word Processing Software
- 15.4" UltraSharp™ Wide Screen XGA TFT Display
- 256MB DDR SDRAM
- 30GB Hard Drive
- Modular 8x DVD-ROM Drive
- 32MB DDR NVIDIA® GeForce™ FX Go5200 AGP 4X Graphics
- 1-Yr Mail-In Service; Serial and Parallel Ports Not Included

\$1249 Lease as low as \$34/mo., (48 prmts.)*
E-VALUE Code: 01282-S80812m

Recommended Upgrades:

- Microsoft® Office Basic Edition 2003, add \$129
- Advanced Port Replicator, add \$169

INSPIRON™ 600m NOTEBOOK

Great Performance, Compact Design – Starting at 4.98 lbs.*

- Featuring Intel® Centrino™ mobile technology
- Intel® Pentium® M Processor 705 (1.50GHz, 1MB L2 Cache, 400MHz FSB)
- Intel® PROWireless 2100 802.11b 11Mbps® Mini-PCI Wireless Card
- Microsoft® Windows® XP Home Edition
- WordPerfect® Word Processing Software
- 14.1" XGA TFT Display
- 256MB DDR SDRAM
- 30GB Hard Drive
- Modular 8x DVD-ROM Drive
- 32MB DDR ATI's MOBILITY™ RADEON™ 9000 AGP 4X Graphics
- 1-Yr Mail-In Service; Serial and Parallel Ports Included

\$1299 Lease as low as \$35/mo., (48 prmts.)*
E-VALUE Code: 01282-S80812m

Recommended Upgrades:

- 512MB DDR SDRAM, add \$100
- NEW Dell™ Laser Printer 1700, add \$199



Small Business Servers & Workstations

POWEREDGE™ 400SC SERVER

Small Business Value Server

- Intel® Celeron® Processor at 2.40GHz
- Upgradable to Intel® Pentium® 4 Processor at 3.20GHz with 800MHz Front Side Bus
- 128MB ECC DDR SDRAM (Up to 4GB)
- 40GB (7200 RPM) IDE Hard Drive
- Upgradable to 500GB of Internal Hard Drive Storage
- Embedded Intel® PRO Gigabit® NIC
- RAID 1 Optional
- 1-Yr Next Business Day On-Site Service*
- Small Business Pricing

\$499 Lease as low as \$14/mo., (48 prmts.)*
E-VALUE Code: 01282-S20804h

Recommended Upgrades:

- PowerConnect™ 2216 16-Port Fast Ethernet Switch; add \$59
- System Including Microsoft® Windows® Small Business Server 2003 (256MB SDRAM Min. Required); now \$1098

POWEREDGE™ 1600SC SERVER

High-Speed Small Business Server

- Intel® Xeon® Processor at 2.40GHz
- Dual Intel® Xeon® Processor Capable (Upgradable to 3.20GHz)
- 256MB ECC DDR SDRAM
- Upgradable to 4GB ECC DDR SDRAM
- 36GB (10K RPM) Ultra320 SCSI Hard Drive
- Upgradable to 876GB of Internal SCSI Hard Drive Storage
- Embedded Intel® PRO Gigabit® NIC
- RAID 1 or RAID 5 Optional
- 1-Yr Next Business Day On-Site Service*
- Small Business Pricing

\$899 Lease as low as \$24/mo., (48 prmts.)*
E-VALUE Code: 01282-S20808h

Recommended Upgrades:

- PowerConnect™ 2616 16-Port All-Gigabit Switch; add \$329
- System Including Microsoft® Windows® Small Business Server 2003 (256MB SDRAM Min. Required); now \$1398

DELL PRECISION™ 360 WORKSTATION

Maximum Performance, Single Processor Workstation

- Intel® Pentium® 4 Processor (2.80GHz, 1MB L2 Cache, 800MHz FSB)
- Microsoft® Windows® XP Professional
- Dell™ OpenManage Client Instrumentation Software Optional
- 512MB Dual-Channel DDR SDRAM
- 40GB (7200 RPM) IDE Hard Drive; 48x CD Burner
- 64MB NVIDIA® Quadro NVS 280 AGP 8X Graphics
- Integrated Intel® PRO 1000MT Gigabit® NIC
- 24x7 Dell Precision™ Dedicated Tech Support
- 3-Yr Next Business Day On-Site Service*
- Monitor Not Included

\$1199 Lease as low as \$32/mo., (48 prmts.)*
E-VALUE Code: 01282-S40811y

Recommended Upgrades:

- 3-Yr Same-Day 4-Hour (5x10) On-Site Service; add \$199
- 19" Dell™ UltraSharp™ 1901FP Digital Flat Panel, add \$699

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