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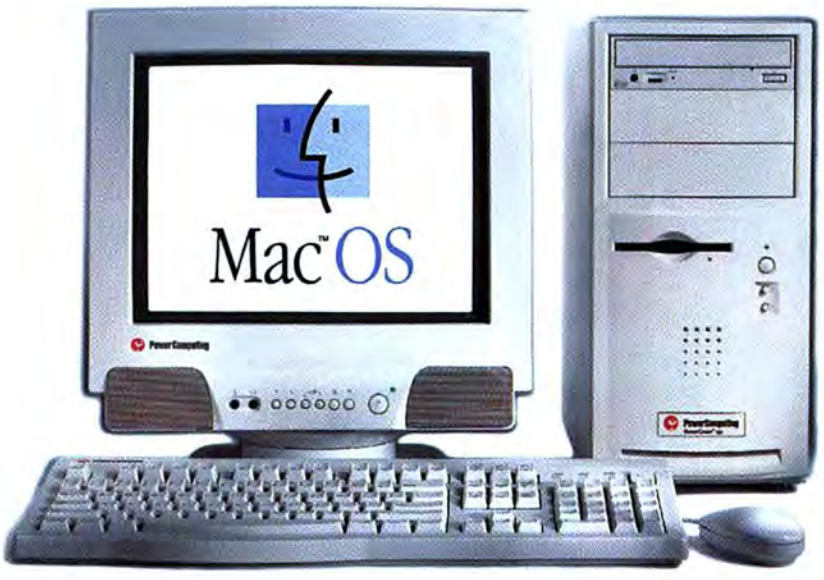

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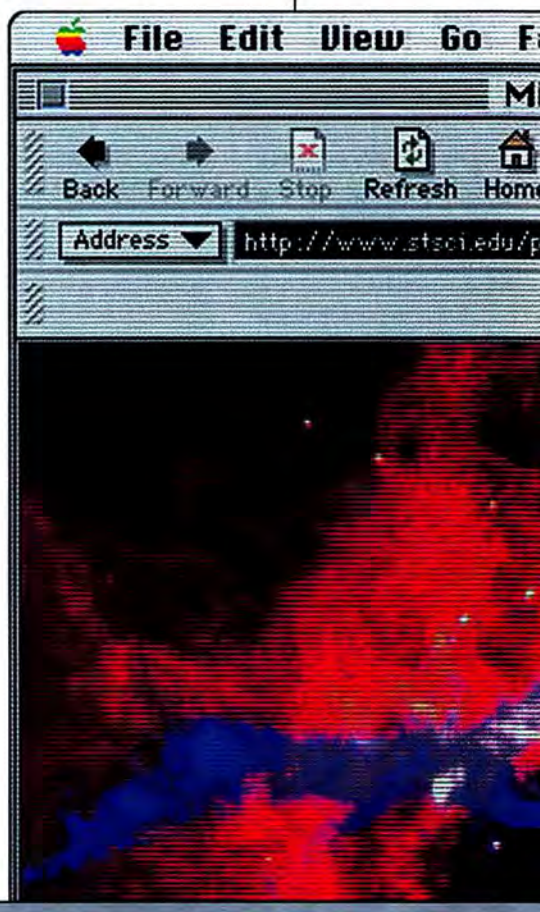

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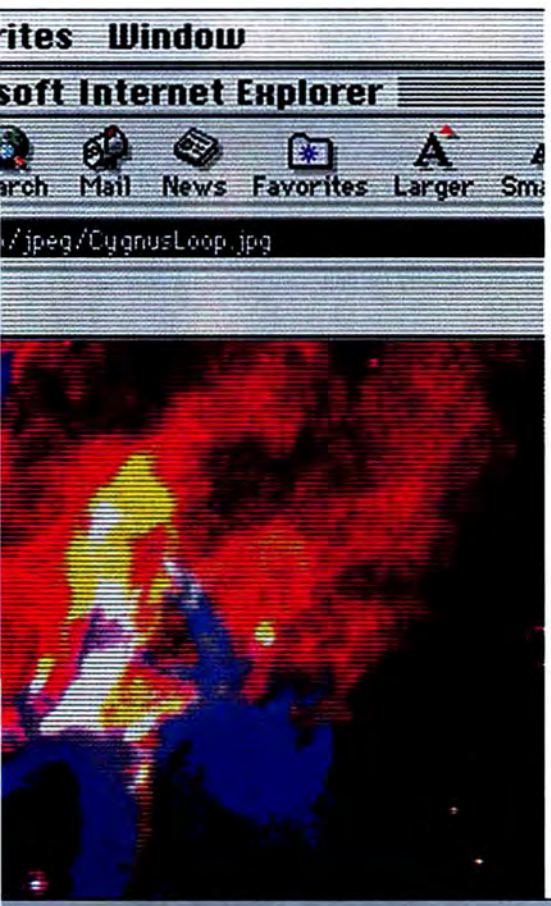

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On the cover / Clones have assumed control, taking the Macintosh to new highs (speed); new lows (prices); and, soon, new functionality. See Reviews, page 32, and Features, page 56.
Cover photo / Giampiero Benvenuti

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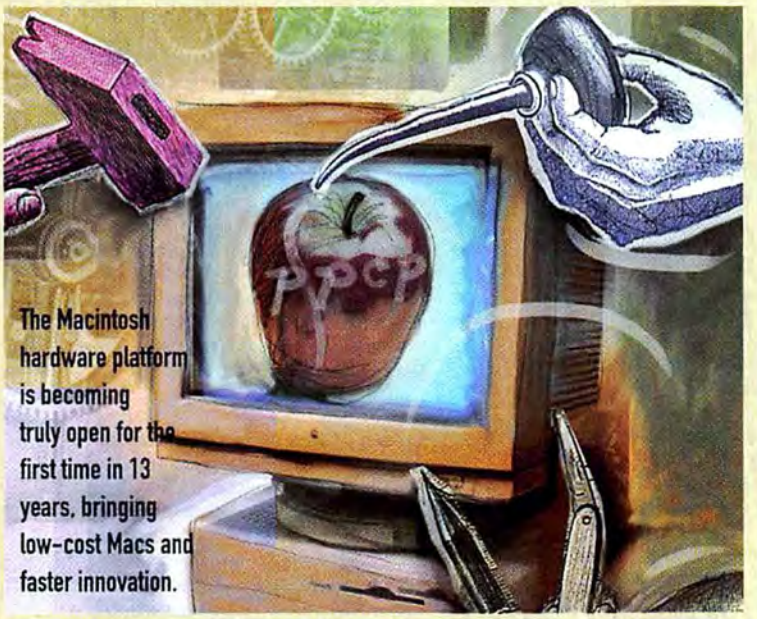
FUTURE MAC



The Macintosh hardware platform is becoming truly open for the first time in 13 years, bringing low-cost Macs and faster innovation.

APPLE, IBM, AND MOTOROLA have been working for three years to open the Mac hardware specification to make it easier to create Mac-compatible systems. The specification, called PowerPC Platform, or PPCP, promises to be the key to sub-$1,000 Mac OS systems, more-rapid innovation from Apple and clone makers, and even new machines running the Be operating system. We deliver the scoop on what will be real — and what won't — when the first PPCP systems ship this summer. **By Henry Bortman / 56**

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The Future of Storage

There will still be disk drives, but the cable that connects them to your Mac will be different and data transfer will be two to ten times as fast as with current storage systems. We bench-test all the contenders battling to replace SCSI as we know it and tell you what to expect, when to expect it, and what to do while you're waiting. **By Rik Myslewski and Kristina De Nike / 62**

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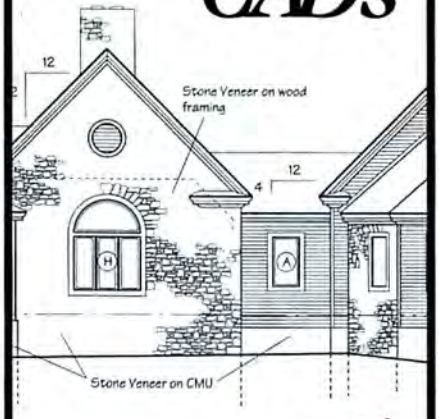

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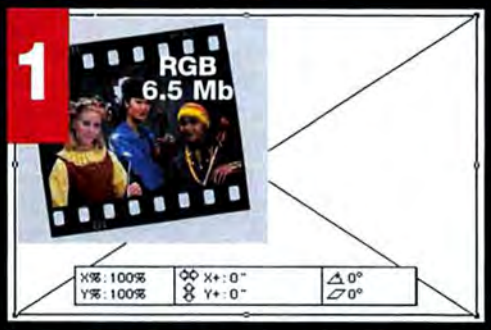

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THE CLIENT APPLICATION

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THE PERSONAL TOUCH

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Tips for QuarkXPress
If you use QuarkXPress as your desktop publishing application, then the July issue of MacUser is just for you! Noted QuarkXPress expert Brad Walrod, author of *QuarkXPress Unleashed*, gives the top 10 time-saving tips for QuarkXPress from basic keyboard shortcuts to more advanced productivity tips. Read MacUser's Desktop Media section and you're guaranteed to learn a new trick or two.

Charging your Charts
Tired of the same 'ol pie chart in your presentations? Want to add pizzazz to bar graphs in your company's Annual Report? If you've answered yes to these questions, then be sure to read the Graphics How-To section in July when MacUser explains ways to make your charts and graphs really stand out in the crowd.

http://www.zdnet.com/macuser/cpu/
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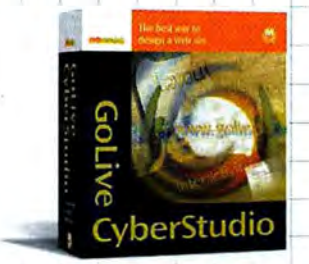

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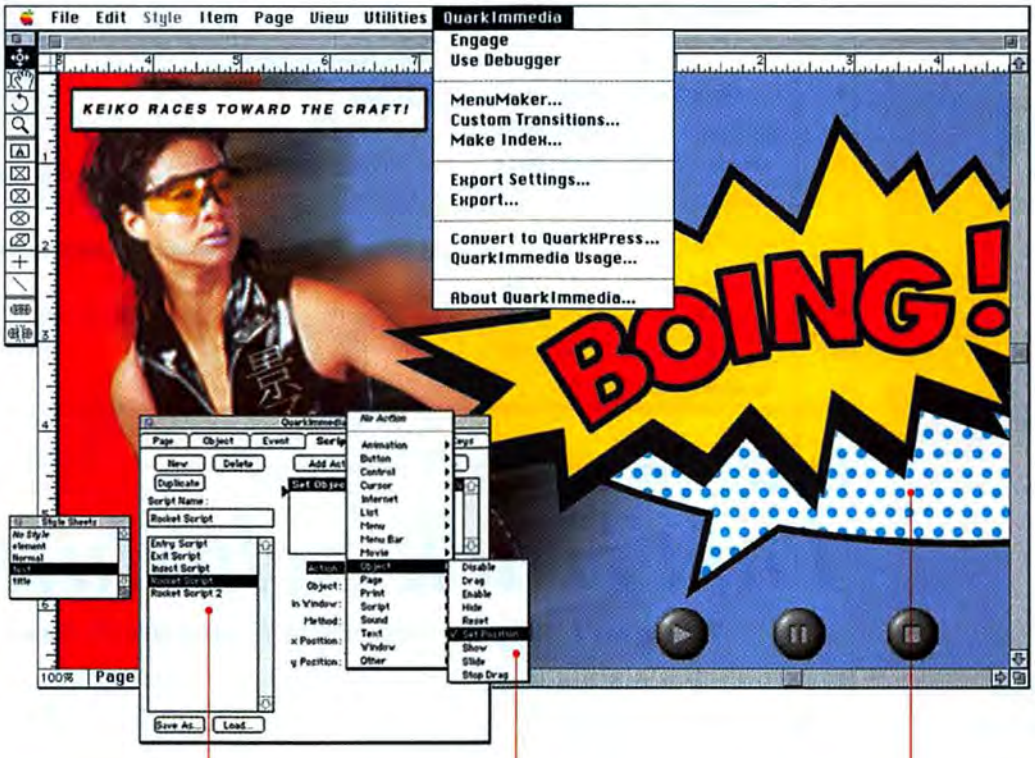

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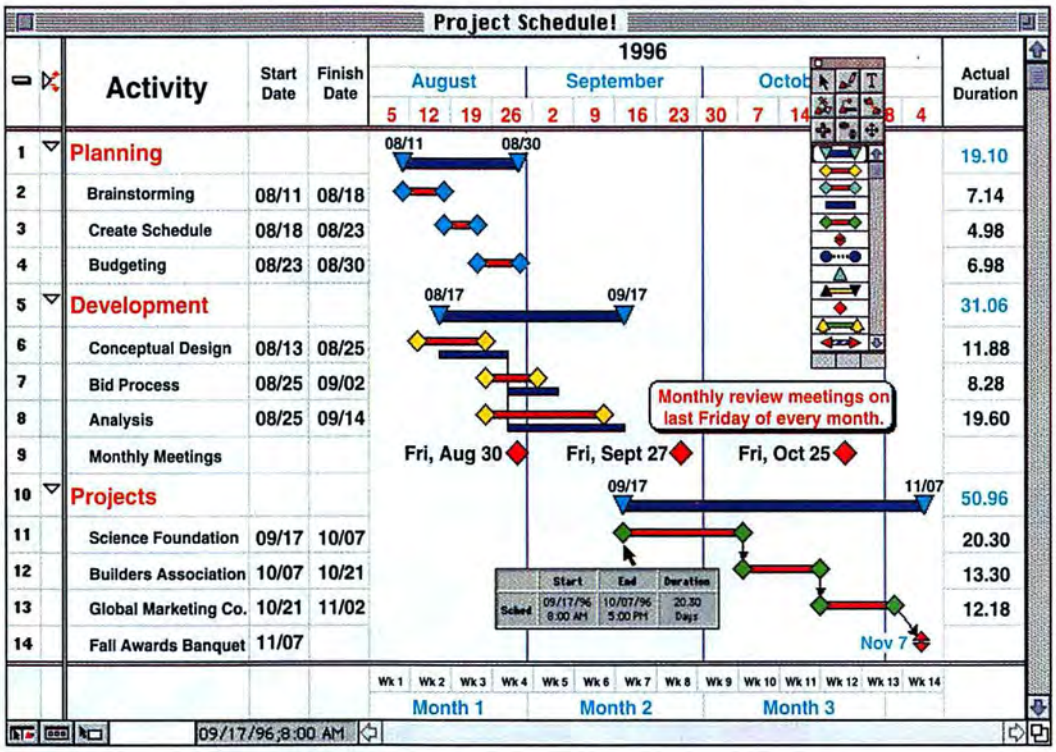

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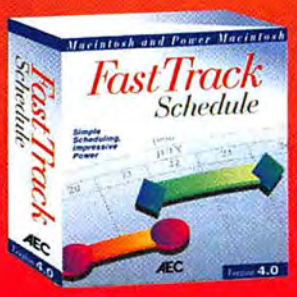

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LETTERS

I Have Met the Enemy

THE MAC HAS NEVER BEEN in more danger than it is now, and that danger comes not from Microsoft, Intel, or any other competitor. It comes from the Mac media. Editors and journalists should be extolling the opportunity the NeXT acquisition brings. Instead, they whine about the lack of details, complain that Apple will never pull it off, or say that they're unsure of its benefits. No wonder newspapers such as the *Wall Street Journal* are already pronouncing Apple DOA. Maybe Apple won't achieve its ambitious timetable, but I for one *hope* it does and will not *assume* that it can't.

Bryan Chaffin
bryan@wwwebservers.com

WHY DOES *MACUSER* THINK it's cool to talk about how much Apple sucks? I'm tired of reading about how bored and annoyed your authors are with Apple. The Mac on my desk is a beast of a computer and a pleasure to use. Considering the alternative of Windows 95, I'm still convinced I made the right choice. Why not support this position?

Melissa Mecca
mecca@macconnect.com

/ Just because we question Apple's actions doesn't mean we don't want Apple and the Mac to succeed. (Believe me, we've also been accused of being too positive when reporting about Apple!). The decisions being made right now are critical to the Mac's long-term success, and our policy is to provide balanced coverage. / PP

Forbidden Fruit

HENRY BORTMAN'S "PowerBook Monopoly" (March '97, page 21) brought back memories of the cage-rattling fury we raised in our call for desktop clones just a few years back. Sure, Apple begrudgingly capitulated, but what Apple called "clone makers" weren't seasoned clone makers at all. Instead, clone licenses were handed off to little startups that could barely make a dent in Apple's bottom line. Open licensing was (and still is) a white lie. Apple hardware protectionism prevails and continues to adversely affect the platform's strength. Serves 'em right.

Craig Koller
via the Internet

The Power to Be Depressed

IT'S A DEPRESSING TIME to be a Mac owner, and for me one of the most depressing moments came when I read your analysis of Mac OS systems ("Which Mac?" March '97, page 84), in which you recommended that prospective buyers *not* buy an Apple machine. It is, of course, your job to present the facts and figures correctly, and obviously clone makers are offering better value in some ways.

What was upsetting was that your article offered no justification — beyond the consideration of mere facts and figures — for those who still might want to buy an Apple-made computer. There are substantial reasons for doing so, you know, such as hardware design and reputation for quality and the need to support a firm that seems in serious jeopardy.

By not supporting the decision to buy Apple products, you are undermining the basic existence of the platform you profess to love. Nobody will be interested in buying a Mac clone if there is no Apple Computer.

James T. Pendergrast
New York, NY

Over-Powering

IS *MACUSER* BIASED in favor of Power Computing? A prime example of this is how your initial coverage of the PowerTower Pro 225 failed to emphasize that it was a prototype or

WRITE TO LETTERS

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Open Folder

It's hard to put this delicately — even harder to stay within bounds of journalistic decency and integrity. Nonetheless, it must be noted that D.M. Stanfield's letter will go down in the *MacUser* annals as the most anal one ever received. And we're not talking "retentive." D.M. nakedly accuses some of our subscribers and writers of "bodacious bootie smooching" when discussing the Mac. D.M. then spanks us for simultaneously and unrelentingly making Apple Computer seem asinine in the pages of our magazine, saying pointedly, "Your position on both sides of the fence must be uncomfortable." Finally, D.M. predicts that if Apple goes the way of Atari, there will still be a cadre of Mac loyalists "just as stubborn as those silly CommodeDoor users." D.M., not that we mind being the butt of your jokes, but are you sure your letter wasn't meant for some other magazine — perhaps *BackUser?*

Moving from the locker room to the lecture hall, we find David Blumenthal holding forth on his convincingly titled disquisition "The Personal-Computer Industry Will Collapse in Three Decades and This Is Why!" For those who missed class, his conclusion is based on seven contributing factors: software piracy/computer hackers, technology speed moving beyond consumers, rising software and hardware prices, the death of think tanks, the death of supercomputers, used computers, and emerging monopolies. He then invoked the specter of the 1929 stock-market crash and the energy crisis of the 1970s. But here our notes get a little sketchy, because by this point, most of us had grown quite bored and had already gone back down to the locker room to challenge D.M. Stanfield to a towel-snapping fight.

Unfortunately, skipping class is not without its consequences. Blumenthal's course may be an elective, but for us editors, attendance in English class really is requisite, lest we become the types of semiliterate dropouts who say *hoards* when we mean *hordes* (as we did in our March issue). Sorry. We'll spell it 100 times on the chalkborde.

ILLUSTRATION / MARGARET MCMULLIN

limited-availability model. This would be OK if other brands received similar treatment, but I can find no mention of a UMAX SuperMac S900/225 in the March issue, and this is a shipping model your mail-order advertisers seem aware of. There's no mention of UMAX's 240-MHz or 200-MHz dual-processor models at all. Surely these products are equally newsworthy and no less available than the PowerTower Pro was at the time of its coverage.

Equally glaring is the lack of copy about Power's quality-control problems and the company's inability to deliver products on time. Since customer support and reliability are supposedly factors in your mouse ratings, these omissions cast doubt on the overall veracity of those ratings.

R. R. Cook-Robinson
LiveMixer@aol.com

/ Hmmm. Is that a UMAX machine on the cover? When it comes to covering the hottest products, it's darn hard to review ones we don't have. Power's knack for getting machines into the hands of reviewers the minute they are finished (which, unfortunately, is sometimes before there are enough in inventory to meet demand) has made it possible for us to cover Power products quickly. Other vendors, such as UMAX, have had a harder time getting new products out for evaluation. The good news is that that's starting to change. And although it is our job to recommend products for our readers, it is our policy to give all vendors fair and equal consideration and let the lab tests and first-hand experience of experts decide which computer is the best. / AG

I THINK THE RESULTS you arrived at in "Which Mac?" (March '97, page 84) fail in many respects to account for the actual state of the Mac market.

Apple machines can be found for prices lower than the estimated street prices you used in your article. I've seen a Performa 6400/180 for $1,199, a Power Mac 8500/180 for $2,799, and other Apple models for prices that were 20 to 30 percent lower than those you listed. On the other hand, I've never seen a Power Computing or UMAX machine on sale for anything less than 90 to 95 percent of your estimated street prices.

Furthermore, you make absolutely no mention of the actual purchasing experience. If you head over to http://www.powerwatch.com/, you'll hear many tales of bait-and-switch tactics, overselling, inexplicably long waits, hard-drive failures, and other woes involved in a Power Computing purchase. Power's ads have dealt with some of these problems more openly than *MacUser* has.

James A. Whitney
via the Internet

/ When we put our "Which Mac" story to bed, the prices used in the evaluations were current as supplied by the vendors. But between the time we finished the story and readers received it, Apple made major price cuts, especially on Performa models that weren't selling. It is because of the fluidity of pricing and even the features of Macs and Mac clones that we maintain the CPU Report Card database on our Web site (http://www.zdnet.com/macuser/cpu), the best place to go for up-to-the-minute reviews and test data on the latest Macs. / AG

Don't Close OpenStep

YOUR OVERVIEW of the Apple-NeXT deal offered some valuable insight into Apple's future plans ("Apple's Next Step," March '97, page 24; "More Than a New OS," March '97, page 26), but you missed several key points.

First, NeXTstep/OpenStep already supports QuickTime via Nextime. Granted, it doesn't yet support VR or the conferencing function, but a foundation exists. QuickDraw 3D is not yet supported, but NeXT offers something even better — Pixar's RenderMan. Combining QuickDraw 3D for low-end work and RenderMan for high-end tasks could make the Mac one of the most compelling 3-D platforms on the planet.

As for QuickDraw GX, considering that some of Apple's own applications don't support it, I think one can safely assume that Apple will opt for NeXTstep's far more elegant Display PostScript solution.

OpenStep is more than just a simple development environment. The user version of OpenStep allows anyone running Windows NT, Windows 95, Solaris, or NeXTstep (on a 486, Pentium, PA-RISC, SPARC, or PowerPC machine) to run applications developed with OpenStep developer tools. Your OS article suggested that OpenStep has a Windows 95 "look and feel." Wrong. If you compile an OpenStep application for Windows 95, it will look like a Windows 95 app. Compile it for Solaris, and it will look like a Solaris app.

You failed to mention that any application developed with OpenStep tools needs only to be recompiled to run on other hardware platforms and operating systems. With OpenStep, Apple has a chance to become an essential, if not ubiquitous, force in the computer industry. If it fails to exploit this advantage — or worse, gets greedy and ties NeXT technology to the Mac and PowerPC exclusively — we might as well not bother waiting for Mac OS 8. NeXT abandoned the idea of proprietary technology several years ago when it became clear that *proprietary* meant *obsolete*. Apple has been too slow to realize this. The company needs to open all of its technology up; make OpenStep the favored development environment on Macs as well as PCs; and finally, make the next Mac OS available on a variety of hardware platforms.

Robert A. Wyatt
rob@bedazzled.com

Let the Seller's Wares Be

I'M NOT HAPPY with how you dismissed Paul Cheng's concerns ("Clones Aren't Clones," March '97, page 14). If, in fact, you're testing some machines with Speed Doubler and some without, your benchmark comparisons are worthless to me also. They're especially meaningless because I use a lot of software that's incompatible with Speed Doubler. Why not disable the gimmicks and let us see what the *hardware* can really do?

Lee Blaske
Excelsior, MN

/ We test systems as shipped to make sure the results we see in our labs are the same you'd see when testing your new system with your own copy of MacBench. MacBench 4.0 is quite sensitive to how systems are configured. In fact, the results you get from MacBench can help you tweak the last little bit of performance out of a particular system. We encourage you to get a copy of MacBench from our Online CPU Report Cards Web page (http://www.zdnet.com/macuser/cpu/) and run your own set of numbers for the particular configuration you desire. / JP

Microsoft Semiotics

DO YOU THINK Microsoft would be increasing its developer support if it thought the Macintosh were going to die? That bunch of penny-pinchers? Never.

Casey O'Donnell
casey42@colorad.net

Corrections

***Roman* is worth seven** Scrabble points (The Game Room, March '97, page 196).

For QTVR gear ("Virtual Vistas," March '97, page 109), contact Kaidan (215-364-1778; http://www.kaidan.com/).

The correct contact information for Deltec (The Geek Beat, December '96, page 27) is 800-335-8321 or 619-291-4211; http://www.deltecpower.com/.

The correct price for Cubase 3.0 VST (see review, March '97, page 50) is $399.

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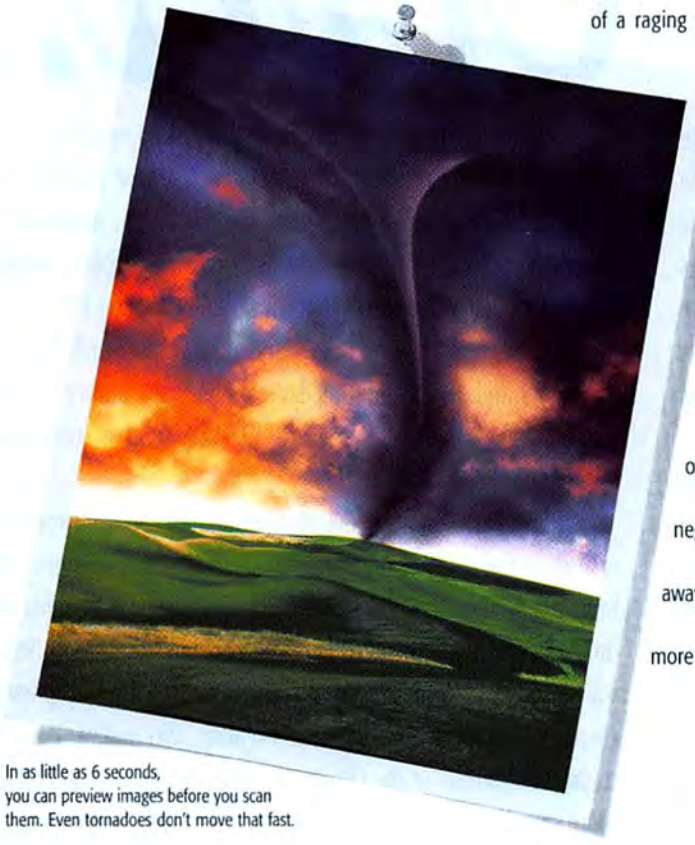

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Apple intends to adopt the Adobe® PostScript™ imaging model for Rhapsody and transfer the best of our existing graphic technologies, including ColorSync and QuickDraw GX.

Apple

CIRCLE **103** ON READER SERVICE CARD

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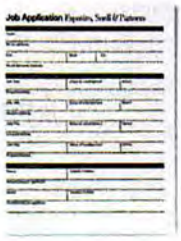

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CIRCLE **150** ON READER SERVICE CARD

PAMELA PFIFFNER

Everybody Must Get Cloned

"OH NO," some of you said when you saw this month's cover. There they go again, promoting CLONES. Doesn't *MacUser* care about Apple anymore? What's the big deal about machines made by some third-party company, anyway?

How did I know some of you would say this? Because many of you have already said it in the letters you send in. For example, seems some of you took exception to our comprehensive buyers guide "Which Mac?" (March '97, page 84) in which Apple's Macs fared poorly. We even went so far as to point it out in a sidebar to the story, entitled "The Verdict: Apple Falls Behind." Judging by the strangled noises emanating from the *MacUser* mailbag, you'd think we'd just made *casserole de lapin* out of the Easter Bunny.

C'mon, people, get over it. Clones are here to stay, and thank goodness. Clones (isn't there a better word?) are starting to contribute significant sales to the overall Mac market. They shore up market share while providing consumers with more choices. How can that be a bad thing?

Case in point: Much has been made in the mainstream media about the Mac's declining market share. Reports by such chip counters as Dataquest and International Data Corp. put the Mac's slice of the American PC pie at a little over 6.5 percent in 1996, down from 11 percent in 1995. Apple shipped 30 percent fewer Macs to U.S. customers in 1996 than in 1995.

Sounds pretty bleak, until you factor in the shipments of Mac OS-compatibles. In the fourth quarter of 1996 alone, more than 130,000 Mac clones were sold, bringing the total number of Mac OS systems sold in that period to 1.053 million. Clones now account for 9 percent of all Macs sold, almost double the percentage of the year before. In the United States alone, clones now make up 13.6 percent of Mac OS systems sold — and that's in just two years of Mac OS licensing.

A few more stats: Motorola sold 40,000 StarMax systems in just eight weeks. UMAX claimed shipments of just under 100,000 Macs in its first six months. And Power Computing sold more machines in its first year than Compaq did in its first. Admittedly, that's a flattering comparison, and one that Power must work hard to sustain.

And 1997 should be even more interesting. UMAX is hitting its stride and putting pressure on Power with competitively priced new machines and multiprocessor systems. Motorola is showing that it's in this for the long haul, with a surprisingly strong showing its first months in the Macintosh business. Storage stalwart and cataloger APS has begun shipping its M•Power clones (see our review in last month's issue) to customers who want customized machines at low prices. Newcomer PowerTools seeks to undercut everybody with rock-bottom prices. A sub-$1,000 Mac, anyone?

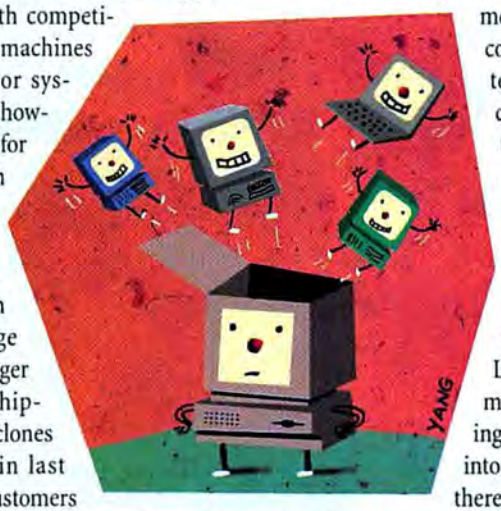

ILLUSTRATION / JAMES YANG

And I wouldn't be surprised if you'll be able to buy a Mac OS-compatible laptop this year. Won't that be sweet?

Like a Rolling Clone

Many of you wrote to complain about experiences with delayed shipments, shoddy manufacturing, and poor technical support, most notably from Power Computing. You wondered if you could trust clone manufacturers to deliver the solid engineering and superior design you've come to expect from a Mac.

The answer is yes and no. Power's early problems definitely made buyers skittish about forking over hard-earned cash for a clone. The company says that it has put new quality-assurance procedures in place and has reduced its shipping turnaround on some models to 48 hours. It's too early to tell if these efforts are making a difference. But Power Computing isn't the only company to experience difficulties. We've also had machines from other vendors arrive weeks late, with dead motherboards and cracked cases — including some from Apple.

I'm not making excuses, but it's easier for me to understand how companies new to systems manufacturing can make such mistakes than how Apple can. While appearing on a call-in radio show the other day, I was peppered with jokes about the PowerBook 5300. Like the poodle in the microwave, the flaming laptops have entered into urban lore. And then there were problems with Apple's newest desktop Macs — the Power Mac 7300, 8600, and 9600 — which caused a brief delay in their shipment.

That's the bad news. The good news? If you need a new Mac now, you can buy a Mac clone. At last, we are no longer being held hostage by the ebb and flow of Apple quality assurance and product supply.

And if you're shopping for a new Mac, turn to Henry Bortman's column this month for what to watch out for when buying a Mac clone. And you can always find the most up-to-date performance ratings of all currently shipping Mac OS systems in our CPU Report Cards (http://www.macuser.com/cpu).

Next month: I'm on vacation next issue, and I'm not taking my computer with me (not that the phone lines are reliable enough in Ulaanbaatar, Mongolia, to let me dial in anyway). *MacUser* Editor Andy Gore will be writing this column in my absence. See you in the July issue.

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HENRY BORTMAN

Caveat Emptor

CLONES ARE GREAT until you have to buy one. It's easy to be dazzled by vendor claims that their offerings are the fastest, latest, and greatest. But a little time spent scratching the surface of those claims can save you a lot of headaches — and money — later on.

Demand Supply. Before you get your heart set on the latest speed demon, make sure it's shipping. Really shipping. Just because a vendor is advertising a particular model doesn't mean it has any stock on hand. Apple, with its chronic underprediction of customer demand, has set ample precedent on this front. But Power Computing is working overtime to take the product-shortage crown from Apple.

Case in point: the PowerBase 240. The PowerBase was a finished, ready-to-ship product back in the summer of 1996, when *MacUser* tested it. Power began advertising it in October. But nobody I know managed to buy one till after the New Year.

Power had a host of reasons — or excuses. First came "240-MHz processors are in short supply." Then, "These systems are being manufactured overseas, and it takes a long time for them to get here." And finally, "We got a couple of large orders that snapped up the whole supply."

Whatever. It all came down to this: PowerBase 240s were nowhere to be found. We know. We tried to order some. If you did, too, you probably got the same response we did: "We do have PowerBase 200 systems in stock." Thanks.

Ask About Upgrades. Although computer makers would be perfectly happy to sell you a new system every year or two, you may prefer coaxing a bit more mileage out of a computer you already own, unless you're independently wealthy.

Upgradability is the key to system longevity. Does the model you're considering have a processor-upgrade socket? Motorola's systems don't. (Neither, incidentally, do Apple's Performas.) Is the Level 2 cache upgradable? is another question to ask clone vendors. UMAX, for example, made the unwise decision to solder a 512K cache to the logic board of its high-end S900 system. Although some vendors argue that there's no value in having a larger-than-512K L2 cache, our tests have shown otherwise.

Ask about the bus speed of your potential system too. The slower a computer's system

bus, the lower the maximum speed on processor upgrades, at least with the current crop of PowerPC chips. A computer with a 40-MHz bus, for example, can't support processors faster than 240 MHz. And even if it could, its relatively slow bus would act as a bottleneck to overall system performance.

And then there's the question of multiprocessing. If you think you might want to upgrade to an MP system in the future, make sure it's going to be possible. Many Mac models don't support this capability. And some vendors take a proprietary approach to MP: UMAX includes two proprietary processor slots in its S900 systems. This makes it less expensive than with single-slot systems to upgrade to two processors, but it also locks you into buying only a UMAX upgrade card.

Check the Specs. When you compare MacBench 4.0 scores for two systems, dig beneath the surface. Make sure you understand all the factors that contribute to one system's getting a better score than another. *MacUser* tests systems exactly as they ship to customers. Some people complain that this approach is unfair. They think we should "level the playing field," by putting an L2 cache of the same size into every system we test, for example. We disagree. Vendors have reasons for configuring their systems the way they do. They put in a larger cache, to continue with the L2 example, to improve performance — and they charge you for it. Vendors that cut corners by putting a smaller, or no, L2 into their systems put a premium on price over performance. Most customers use a system exactly the way it comes out of the box — and that's precisely how we test them.

But that's why it's important for you to know why a particular system got the score it did on a particular test. Take MacBench's disk tests, for example. The main reason one system does better than another on these tests is because different drives have dramatically different performance characteristics.

Can you, as a user, tweak your system to improve on what the vendor offers you? Sure. The easiest way to do this — not to mention that it doesn't cost anything — is to boost the size of your disk cache, which you set in the Memory control panel. Of course, this eats up some of the physical RAM that would otherwise be available to run applications.

Read the Fine Print. In particular, check the warranty. If something breaks, are you entitled to on-site repair or do you have to ship your machine to the vendor to get it fixed? If shipping is required, who pays for it? What's the guaranteed turnaround time on repairs? Will the company cross-ship you a working system while it's fixing your broken one?

Motorola's warranty is particularly entertaining. The company trumpets its unique five-year warranty, but if you examine it closely, you'll notice that in the fourth and fifth years, Moto can either "repair or replace the system . . . or . . . refund to the customer the then fair market value of the system unit." Now you tell me: What's the fair market value of an over-three-year-old system?

ILLUSTRATION / SACHA ECKES

Who better to make your Mac than the company who designed the PowerPC™ chip?

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Our MacUser "Best Buy" StarMax 3000/160 MHz computer is now a better buy at 180 MHz and $1,249.*

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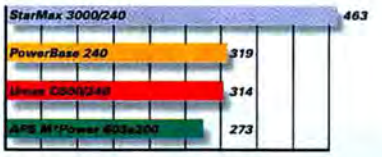

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NEWS

BETWEEN THE LINES / BY ANDREW GORE

Mac OS to Run on Intel Chips

Apple's new software chief outlines revolutionary plans for the next Mac OS.

Avie Tevanian

A TOUGH YEAR awaits Avie Tevanian, former vice president of engineering at NeXT Software. Recently anointed as Apple's senior vice president, system software engineering, Tevanian has what is quite possibly the most challenging job in the computer industry: creating the next Mac OS. I sat down with him to get his take on Rhapsody (Apple's code name for its upcoming operating system) and on the rumors that future PCs may come equipped with a "Mac Inside" sticker.

AG. What is the timeline for Rhapsody?

AT. We have three major milestones in our planned rollout. The first one, which will occur around the middle of the year, will be our Developer Release. The goal of this release is to seed developers with the APIs, so they can start creating applications that will run when the final product ships.

Next is the Premier Release. The Premier Release will get out by early next year, which means in the January/February time frame. We would like to get it out by the end of 1997 if we can, but we hesitate to commit to that, because it's still a little bit far out. The goal of the Premier Release is to be a fairly solid release, so that early adopters can start to use it, evaluate it. And it will have the first public version of support for Blue Box (the part of the upcoming operating system that will run System 7.x applications).

> *'Go buy from Compaq, Dell – whatever PC vendor you want – and you can run Rhapsody.'*

We will complete the Rhapsody rollout in the middle of next year. This will be the Unified Release, which is the complete Yellow Box (NeXTstep API), the complete Blue Box — everything fully functional, fully supported. At that point, anyone ought to be able to use Rhapsody without any restrictions.

AG. What is Rhapsody going to offer developers to induce them to port their applications to Yellow Box and not just rely on Blue Box?

AT. First of all, from a technical perspective, the Yellow Box frameworks are very powerful, making it extremely easy to build very nice applications very quickly. For example, if you're a small development shop and you want to do something to change the world, you're going to be able to bring your new application to market for far less cost and much quicker with Rhapsody technologies. You

FUTURE TECH

For Next-Generation PowerPC Chips, Less Is More

DOWNSIZING CONTINUES to be all the rage in corporate America. Employees are stuffed into smaller work spaces, get less power, and are expected to increase their productivity by following the infuriating dictum "Work smarter, not harder." Apparently the engineers of the PowerPC Alliance have also decided that downsizing is a great idea — for the design of the first representatives of the next generation of PowerPC microprocessors.

This summer, Mac OS systems will appear that will be powered by two new PowerPC chips any corporate HR director would love. These as-yet-unnamed chips (or *parts*, in microprocessor parlance) take up very little space, require very little power, and do only the work that's absolutely necessary to efficiently run the Mac OS and its applications.

The tiny size and low power requirements of these two new parts are remarkable — especially when the chips are compared with those of the behemoths coming out of the factories (or *fabs*, in chipspeak) of the Alliance's competition, Intel. Each new part crams 6.35 million transistors onto a 67-square-millimeter slice of silicon. Compare that with the 200 or so square millimeters required to fit the 5.5 million transistors on a Pentium Pro, and you can guess why the Alliance is predicting that its new parts may be significantly less expensive than Intel's current flagship chip.

And they'll run on far less power too. A 200-MHz Pentium Pro typically sucks wattage in the mid-30s; the new Alliance parts require only 5 watts when humming along at 250 MHz. What's more, they come equipped with progressive power-saving modes — affectionately called Doze, Nap, and Sleep — that increase their mobile-computing value.

Small size, low cost, and frugal power requirements are all well and good, but only if a part can hold its own in the performance wars. According to Alliance documents, the new parts should do very well, thank you. Quote: "With a 1MB L2 cache operating at half the processor clock frequency and a system bus operating at 50MHz in a 5x mode, the processor performance is estimated at 10 SPECint95." Don't sweat the details; just compare that score of 10 on the industry-standard SPECint95 benchmark test with that of a top-of-the-line 200-MHz Pentium Pro: a hair over 8.5.

But high benchmark scores are only part of the story. Remember "smarter, not harder?" As maddening as that advice may seem, Alliance engineers

can focus on what your idea is and your added value instead of how to make menus work.

In addition, we'll be making the APIs and the tools available cross-platform. So as you're developing for Rhapsody, you're not limited just to Apple's customer base. You can now also go after NT-based systems or even sell the software for PCs running Rhapsody.

AG. You said Rhapsody would support PCs. Could you explain?

AT. The term *Rhapsody* is identified with the whole architecture, including the user interface, Yellow Box, Blue Box, and the core OS. In terms of platform support, the easiest case is the PowerPC. It's all there. When you move to Intel, there will be the ability to run Rhapsody on a generic Intel PC. Go buy from Compaq, Dell — whatever PC vendor you want to buy from — and you can run the entire Rhapsody software stack with the exception of Blue Box.

AG. So, the only thing you won't be able to do is run legacy Mac apps?

AT. That's right, no Blue Box applications. There's yet a third option — you can take the Yellow Box APIs and run those on top of NT. Then you don't necessarily have the whole operating environment, but you have the ability to run Rhapsody applications on top of NT on PCs.

AG. Do you have a feeling for how long it will take to get the PC versions of Rhapsody done?

AT. We have not publicly talked about commitments for when we're going to deliver these options, but I believe it's safe to assume there are no major lags behind any of the releases we already have planned for the PowerPC.

[For a transcript of the entire interview with Avie Tevanian, go to http://www.macuser.com/onlinecol/tevanian.html. — Ed.]

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have taken it to heart, crafting their new parts to work hand in glove with the Mac OS. Without getting into such dweebian technical niceties as on-chip L2-cache tag RAM and dynamic branch prediction, let's just quote the projected results: 40- to 45-percent real-world improvement over the 604e and 80- to 90-percent improvement over the 603e. What's impressive about these claims is that they're based on MHz-to-MHz comparisons, even though the new parts are expected to first appear at 250 MHz and then increase to 400 MHz by the end of their life cycle.

Of the two new parts, one can be immediately dropped into existing motherboards. The other, which has extra pins to accommodate a performance-enhancing 1-to-1-clock-rate attachment to its L2 cache, will appear in systems a bit after the first, after Mac OS system designers have had time to accommodate it. If the Alliance's speed estimates are true, we should see some screaming low-cost Mac OS systems in the near future. */ RIK MYSLEWSKI*

FIRST LOOKS

Director 6:

Macromedia offers powerful new Web animation tools.

IT'S NO SURPRISE that Macromedia has taken pains to address many of the more problematic issues of content delivery on the Web in Director 6, the soon-to-be-released upgrade of its pioneering multimedia-authoring application. The Web is where the action is — and every day that action includes more multimedia and animation.

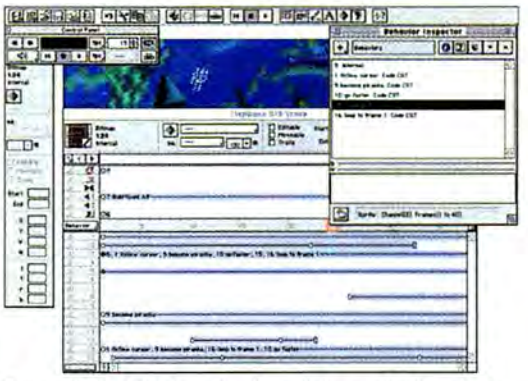
We took a close look at a beta version of Director 6 and discovered many Web authoring enhancements, all welcome and few easily available in competing products. For example, Macromedia Shockwave files can now stream over Net connections — they can begin playing before they're entirely downloaded.

Director can establish an unprecedented level of communication between Shockwave and other advanced Internet technologies, including JavaScript, ActiveX, and Live Connect. Also, Shockwave movies can be placed in HTML documents by use of the standard Java Applet tag, allowing them to play on browsers that lack the Shockwave plug-in.

Shockwave movies can now be tested — and debugged — directly on the authoring machine; you no longer have to upload the files to a server. In another important addition for serious media developers, new Lingo commands have been implemented to facilitate the creation of hybrid CD-ROM/Web applications, allowing CD-ROM interfaces built in Director (and playing from a local CD-ROM) to link to live data from the Web. What's more, Xtras (Director extensions that extend its functionality) can now be embedded directly in Shockwave files, making it easier to distribute enhanced Shockwave applications.

Longtime Director users will appreciate that the maximum number of "castmembers" (individual animated elements) on-screen at any one time has been increased to 120 (compared to 48 in Director 5). Several long-overdue enhancements have been added to the Score window (the main timeline display for animated elements). Among them are zooming and scaling the Score display and displaying multiple simultaneous Score views. Many smaller, positive changes have also been made to the way individual frames in the Score are edited.

The new Behavior Inspector palette makes it easy to quickly write basic Lingo commands. Acting as a type of "wizard," the Behavior Inspector also allows a particular chunk of Lingo to be treated as an encapsulated "pseudo-object": The behavior can be dragged and dropped onto other castmembers, which then automatically inherit the Lingo and its associated behavior. Although this addition is not a full-featured object model, it's still an improvement over the Lingo implementation in previous versions of Director, which required repetitive — and laborious — code writing.



The new look of the Score timeline window makes it easier to do comprehensive editing of animated elements in complex compositions.

External media editors can automatically be invoked from within Director: Instead of using the Director Paint module (which looks more dated with each release), you can designate a program such as Photoshop to be your default image editor — simply double-click on the image, and Director 6 will automatically open the selected image, using the default editor. Separate external editors can be designated for text, audio, and graphics.

All in all, the many improvements and additions are likely to please seasoned Director fans and new users alike. We look forward to the release version of the program to see how well these significant improvements actually perform in real-world applications and how well Director 6 works with the other elements bundled with it in Director 6 Multimedia Studio: SoundEdit 16 v2.2, Sonic Foundry Sound Forge XP, Extreme 3D 2, and Macromedia xRes 3. */ DAVID BIEDNY*

PROS: Significant enhancements for Web authoring. Transparent Java and ActiveX support. Improved Score interface.
CONS: Still has steep learning curve. New object-handling features not fully satisfactory.
INFO: Director 6 Multimedia Studio, $999; Studio upgrade, $499; Director-only upgrade, $399. Macromedia: 800-945-9354 or 415-252-2000; http://www.macromedia.com/.

NEW & NOTABLE

Kai's Pixel Soap. The unique interface of this image-editing tool, the first in MetaTools' new MetaWorld series, has 3-D tools that float above a virtual desktop and control 48-bit-color calculations and 16-bit alpha channels. Other features include selective color correction, real-time zooming and panning, and continuous undo. $49. MetaTools: 805-566-6200; http://www.metatools.com/.

Asanté Mini PCI Network/Modem. This mini plug-in PCI card for the new Apple PowerBook 3400 gives you 10BASE-T Ethernet access and a 33.6-kbps fax modem. $495. Asanté: 800-662-9686 or 408-435-8401; http://www.asante.com/.

Spreadsheet 2000 2.0. This upgrade to Let's Keep It Simple Spreadsheet 1.0 is more visually oriented, letting users create formulas in customizable color input and output grids with the aid of colored indicators that warn against incorrect formulas. $110; upgrade, $39.95. Casady & Greene: 800-359-4920 or 408-484-9228; http://www.casadyg.com/.

Microtech RoadRunner 1000, 1380. These 2.5-inch SCSI hard drives are compatible with Apple's 100-, 200-, and 500-series PowerBooks. RoadRunner 1000, $899; RoadRunner 1380, $999. Microtech: 800-222-9488 or 203-468-6223; http://www.microtechint.com/.

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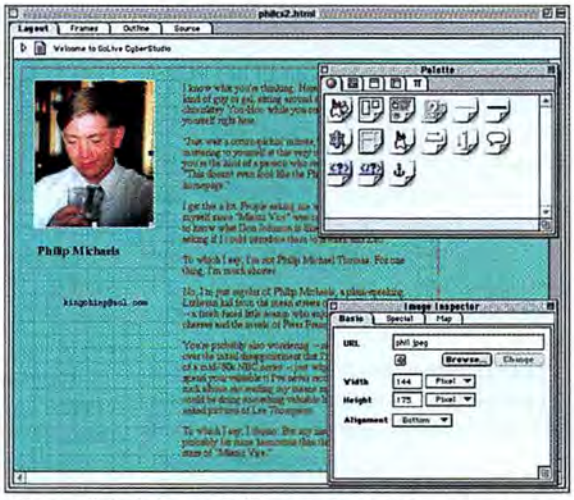
Digital Vision. Image Club promises relief from "dated imagery" and "stiff poses" with its new line of 30 specially commissioned stock-photo CD-ROMs. Each volume contains 100 images. $249.99 each. Image Club Graphics: 800-661-9410 or 403-262-8008; http://www.imageclub.com/. / *BROOKE C. WHEELER*

FIRST LOOKS

GoLive CyberStudio:
Multifaceted Web authoring tool.

THE BEST FEATURES of all three types of Web authoring tools — raw-text editing, as in BBEdit; word-processor-style graphical tools, as in Adobe PageMill and Claris Home Page; and page-grid layout, as in NetObjects Fusion — can be found in the soon-to-be-released GoLive CyberStudio.



CyberStudio is similar to NetObjects Fusion in that you can place pictures and text on a layout grid, dragging in elements from icon palettes.

Like PageMill, GoLive CyberStudio — an entirely new tool from the company that published the former PageMill competitor GoLive Pro — lets you create HTML pages that obey all the rules (and suffer from all the limitations) of HTML. But CyberStudio also lets you use free-form, grid-based design tools à la Fusion: After you've dragged a grid into the CyberStudio window, you can place text and graphic objects on the grid and move them anywhere you like (except on top of one another — that's something HTML doesn't let you do). CyberStudio automatically generates the HTML code required to create your design.

While you're designing your pages, you can switch into two other page views with the click of a tab: In Outline mode, you can see your document in terms of the HTML tags you use — a view that can speed the debugging of pages containing errant code. In Source mode, CyberStudio displays your page with raw HTML codes color-coded to make them easier to understand. Any changes made in either of these two modes will also affect the WYSIWYG version of your document.

GoLive CyberStudio supports all commonly used text-style tags, including text colors and fonts. Its support for the Font Face tag is the best we've seen, allowing authors to create Font Sets — series of related fonts that let you specify which font should be substituted if a particular font isn't present on a reader's system.

The program also supports tables (although for most layout uses, users will probably want to use CyberStudio's page grid) and multiple interactive

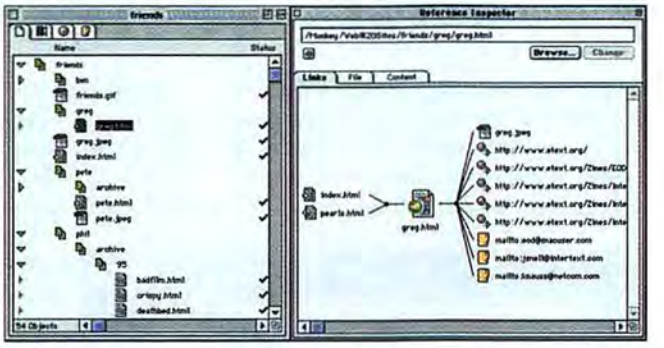
Quark Buzz Grows As Upgrade Nears

CHANGE OR DIE. Nowhere is this saying taken to heart more than in the computer industry and (thanks, in part, to the Internet) at no time more seriously than today. But what of QuarkXPress, the indomitable page-layout program? Used by most major publications and capturing most of the market's revenue (about 60 percent, even by Quark competitor Adobe Systems' estimates), QuarkXPress hasn't been upgraded significantly in six years. Six. Years. With QuarkXPress 4.0's features and ship date still unconfirmed at press time and Adobe PageMaker 6.5 now rolling off the assembly line, rumors abound about the coming QuarkXPress upgrade.

MacUser's sister publication, *MacWEEK*, reports that QuarkXPress 4.0 will support greater design flexibility by including a set of Adobe Illustrator-like drawing tools for creating text and picture frames and text along a path. It also reports that the new version will boast HiFi Color process printing, allow users to mix percentages of spot colors within the program, and support EPS and TIFF clipping paths. Quark won't confirm these reports, but when asked, Ed Owens, Quark's manager of evangelism, referred users to the *MacWEEK* article (http://www.macweek.com/mw_1103/nw_quark.html).

Officially, Quark has announced that QuarkXPress 4.0 will ease the plight of long-document creators, by offering enhanced indexing and table-

forms on a single page. GoLive says that since CyberStudio's database of HTML tags is a "module" separate from the rest of the application, the program can be made to support forthcoming HTML features without forcing users to download a whole new application.



CyberStudio's project window lets you easily manage a site's pages and links.

CyberStudio supports frame sets — an HTML feature that lets you place multiple HTML files in one window — but doesn't let you edit pages within their frame set, unlike PageMill. We hope GoLive will consider adding this feature to the final version, given that creating frame sets is difficult if you can't edit the pages in place.

CyberStudio's support for multimedia is without peer. You can add Java applets or browser-plug-in files to a page and then run them within the editing window. CyberStudio also understands variables supported by many common plug-ins, making it easier to control the appearance of plug-in objects on your pages.

In addition to offering authoring features, CyberStudio helps Webmasters keep track of their sites. CyberStudio's project window lets you view all of your Web site's documents and links. If you move a file to a new location, using the Finder, CyberStudio can quickly update the links to that file. Like Fusion, CyberStudio allows you to arrange your pages in an organizational hierarchy and can also automatically generate an MCF (Meta-Content Format) document for use with Apple's HotSauce Web-navigation plug-in. But unlike Fusion, CyberStudio doesn't automatically generate navigational items on your pages — Fusion's got CyberStudio beat in this respect.

GoLive Pro, GoLive's first Web authoring product, offered an attractive and easy-to-use interface but didn't make the grade in terms of features. CyberStudio's interface is just as attractive, featuring floating palettes containing groups of template icons you drag and drop into your editing window. The feature set is impressive indeed.

Given the fast-moving state of the Web publishing market, we have no doubt that other products will quickly move to match CyberStudio's feature set. But for now, GoLive has a leg up on all its competitors — CyberStudio should appeal to all serious Web authors who want a powerful graphical page editor. / *JASON SNELL*

PROS: Interchangeable pasteboard and word-processor metaphors. Attractive interface. In-line support of plug-ins and Java applets.
CONS: Doesn't automatically generate navigational elements. No support for editing HTML pages within a frame set.
INFO: $349. GoLive Systems: 415-463-1580; http://www.golive.com/.

of-contents features. Quark has also announced support for ColorSync 2.0, Apple's color-management software; character-based style sheets; and the features of QuarkPrint, including the ability to print discontiguous pages.

At Thunder Lizard's QuarkXPress Conference this February, many of the 130 attendees said they didn't mind Quark's slowness to upgrade — third-party XTensions and AppleScript automation satisfy most of their needs. But one user did remark that he was disappointed with Quark's Internet efforts, such as the $995 QuarkImmedia XTension released last fall. QuarkImmedia lets designers use QuarkXPress tools to create pages that can be seen on the Internet, but only with a special viewer. "For the most part, people like me aren't as concerned about ease of development as we are with ease of use for users," says Benjamin Hubble, communications assistant at Whittier College, in Whittier, California. His department is still figuring out the best way to put its QuarkXPress-produced alumni magazine on the Web. "I was frustrated they didn't concentrate more on HTML," he says.

Indeed, rumblings have been heard among QuarkXPress power users that PageMaker's new Web capabilities may finally tempt them from the Quark fold. Several XTensions aid the conversion of QuarkXPress pages to Web pages, but PageMaker now natively supports conversion to both HTML and Adobe Acrobat's PDF. PageMaker's HTML features include automatic reformatting of text and graphics for the horizontal screen, a hyperlinks palette, and graphics conversion to Web formats. / *SCHOLLE SAWYER*

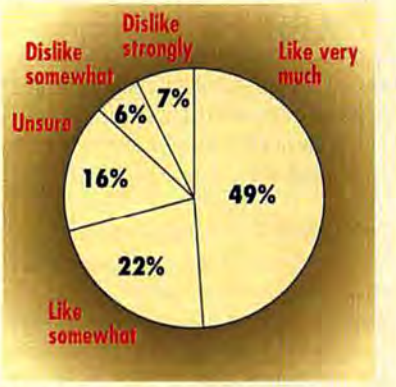
IN BRIEF

Macromedia to Do DTV

MULTIMEDIA KING Macromedia is diving into the digital-video market, with Final Cut, its new heavyweight digital-video-editing software. Final Cut's drag-and-drop editing environment is built around a central "player," with each window functioning as a plug-in. Features include an extensive set of effects and filters and the Realtime option for use with dual-stream digital-video boards. Pricing isn't set, but Macromedia says that the cross-platform product will run in the $1,000-to-$3,000 range when it ships in mid-1997. Macromedia: 800-326-2128 or 415-252-2000; http://www.macromedia.com/. / *BROOKE C. WHEELER*

A Vote of OS Confidence

Q. WHAT DO YOU THINK of Apple's decision to go with NeXTstep as the basis for the next Mac OS?



Five thousand people responded to our most recent Web-based poll, and a huge majority of them — 71 percent — approve of Apple's decision to base its next OS on NeXTstep. But maybe most poll respondents were simply happy to have a choice of two upcoming Mac operating systems — Apple's next OS and the BeOS. (To register your opinion in *MacUser*'s online polls, go to http://www.macuser.com/poll.html.) / *JASON SNELL*

Motorola to License BeOS

LIFE GOES ON for never-say-die Be. After losing out to NeXT in the Mac OS battle, Be licensed its powerful BeOS to Power Computing. Now the Motorola Computer Group has announced its intent to bundle the BeOS, with the Mac OS, on its StarMax Mac clones. Also, Be and Motorola have formed a technology alliance and will study the feasibility of using the BeOS on Motorola's high-end PowerStack systems. Although the hoped-for flood of BeOS applications is a disappointing trickle, the BeOS is a viable PowerPC OS alternative — a well-positioned one if Apple's Rhapsody effort should stumble. / *RIK MYSLEWSKI*

NEW & NOTABLE

Astound WebMotion. Create streaming, Java-based multimedia Web content — including 2-D animation and sound — that doesn't require a plug-in to view. $69.95. Astound: 888-427-8686 or 415-845-6200; http://www.astound.com/.

Total PowerSMP. Boost your Mac's speed with one of this family of application-accelerator cards, each equipped with one, two, or four PowerPCs; a 128K L2 cache; and two SIMM slots. Available processors are a 132-MHz 604 and a 165-MHz, 198-MHz, and 231-MHz 604e. $1,400 to $5,400. Total Impact: 805-987-8704; http://www.totalimpact.com/.

Tektronix Phaser 450. New color-calibration and -correction options and reformulated dye-sub media enhance this color printer's latest incarnation. Print up to 9.3-x-12.7-inch, full-page bleeds for prepress proofing. $6,995; upgrade from Phaser 440, $695. Tektronix: 800-835-6100 or 503-682-7377; http://www.tek.com/.

Microtech MicroDAT 24000. This DAT drive, which has a data-transfer rate of 1.2 megabytes per second, stores 24 GB at 2:1 compression or 12 GB in native mode on a 125-meter DAT tape. $1,999. Microtech International: 800-220-9489 or 203-468-6223; http://www.microtechint.com/.

Conflict Catcher 4. This utility's reworked interface now displays file icons and load times, and the program includes such new features as plug-in management and automatic conflict testing after startup crashes. $69.95; upgrade, $39.95. Casady & Greene: 800-359-4920 or 408-484-9228; http://www.casadyg.com/.

▼ FARGO Signature CD Color Printer. Print water-resistant, CMYK text and graphics directly on printable-surface CD-R media. This thermal-inkjet printer prints at two resolutions (300 x 300 or 600 x 300 dpi) on one disc at a time. $1,295; CMY cartridge, $52.95; black cartridge, $39.95. FARGO Electronics: 800-205-5852 or 612-946-8415; http://www.fargo.com/.

Design Your Own Home 3D WalkAround. Create 2-D layouts and 3-D walkthroughs (at up to 15 frames per second) with this CAD software, using its libraries of objects, textures, and floor plans. $100. Abracadata: 800-451-4871 or 541-342-3030; http://www.abracadata.com/.

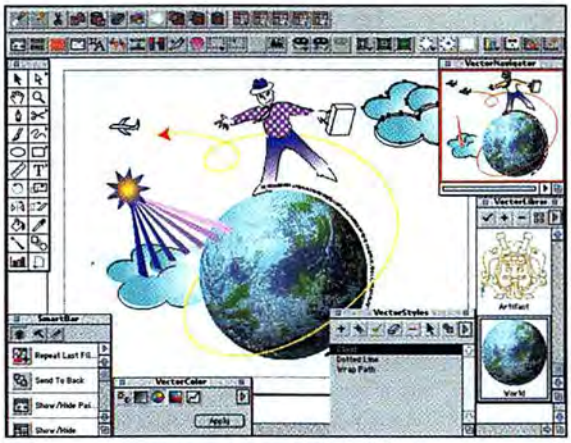
MAPublisher 2. Import GIS (Geographic Information System) map files into Adobe Illustrator for editing, layout, and PostScript conversion. $495; upgrade, $99. Avenza Software: 800-884-2555 or 905-639-3330; http://www.avenza.com/. / *BROOKE C. WHEELER*

FIRST LOOKS

Extensis VectorTools

FRUSTRATED BY FLASH over function? It's a common lament for many users of drawing-program plug-ins, since only a few meet users' basic needs and offer significant time savings for Adobe Illustrator and Macromedia FreeHand.

Extensis DrawTools 1.0 has proven itself to be one of the only real productivity boosters. Our first look at a beta version of its renamed upgrade, Extensis VectorTools 2.0, due out this spring, proves that the legacy continues.



VectorTools for Illustrator includes VectorStyles, which lets you save object attributes as styles, and VectorLibrary, a drag-and-drop palette of commonly used images and text.

VectorTools doesn't have the single-feature punch of other drawing plug-ins, but it's blossomed into a strong collection of useful, everyday tools for Illustrator and FreeHand. The package contains VectorTools versions for both drawing programs, with Illustrator users getting the slightly better deal.

VectorTools 2.0's host of handy features has one standout, the simple but convenient VectorLibrary. Embed often used artwork, photos, and text in the library palette for quick drag-and-drop access — like using a library in QuarkXPress.

The new VectorMagicWand

Microtech 3D Xplosion:

Inexpensive 3-D-game speed booster.

MacUser LABS

IT'S NOT CLEAR WHETHER the Power Mac will succeed as a 3-D-gaming platform, but it's unlikely to do so unless powerful — and cheap — 3-D hardware becomes standard equipment. With all the big-name 3-D-chip vendors eagerly porting their existing firmware and drivers to the Mac, plus the promise of new chips on the way, this looks to become a reality.

One such chip powers the soon-to-be-released Microtech 3D Xplosion card. In fact, the 3D Xplosion is nothing more than a single PIX 3D Graphics Processor, from S-MOS Systems, mounted on a card; PCI cards don't get any simpler than this.

PROS: Simple. Inexpensive.
CONS: Not as fast as cards with dedicated texture memory.
INFO: $139 (list). Microtech International: 800-220-9489 or 203-468-6223; http://www.microtechint.com/.

Unlike ATI's popular 3-D-graphics accelerator, the Xclaim 3D, which uses its own RAM to store texture maps locally, the 3D Xplosion uses existing system memory instead. This approach lowers the card's cost — and speed. Since moving textures across the PCI bus is somewhat inefficient, any card using this approach will be outperformed by more-expensive cards equipped with dedicated texture RAM. In addition, the 3D Xplosion works in conjunction with existing graphics-card or built-in display circuitry — another bottleneck a combo 3-D/display card doesn't have.

Still, it's a bargain: The 3D Xplosion will sell for about $100 less than the least expensive of ATI's 3-D-graphics offerings — and, according to an S-MOS spokesperson, cards utilizing the PIX chip will soon be available at a street price of below $100.

We tested an early version of the 3D Xplosion with not-yet-even-beta-release drivers and saw noticeable, although not staggering, improvements in 3-D-game performance. Performance should

2.0: Solid, useful plug-in package.

adds a needed feature to Illustrator and improves on a FreeHand standard. Illustrator users who envy FreeHand 7's Find & Replace Graphics (which searches for and replaces an object attribute — a stroke width of 6 points, for example) will appreciate how VectorMagicWand takes this idea one step further. You can set the magic wand's specifications to find a *range* of attributes — for example, every stroke with a width between 5 and 7 points.

But as FreeHand and Illustrator are two different packages, so are their VectorTools versions. What may sell VectorTools to Illustrator users is a tool FreeHand users already have — object style sheets. VectorStyles lets you save attributes set in the Paint Style dialog box (such as stroke color) as a style. To apply the style, you select an object and double-click on the style name. VectorStyles doesn't pack the scripting-like power of Alien Skin's Stylist, but it's easier to use.

VectorTools' FreeHand version has two exclusive tools, VectorType and VectorCaps. VectorType gives FreeHand users character-level control over text, and VectorCaps allows them to change word case with a single click. Yet neither tool will prove as essential to FreeHand users as the powerful VectorStyles will be to Illustrator users.

Rounding out the VectorTools package are searchable tips and preset frame options and custom-tool-bar creation for Illustrator users. The handy VectorNavigator palette shows a miniature of your image with a red box indicating the zoom-in area so you don't lose your place.

VectorTools 2.0's simple, convenient tools make it a great plug-in package for both Illustrator and FreeHand, with Illustrator users having a few extra incentives to buy. */ SCHOLLE SAWYER*

PROS: Well-rounded collection of productivity tools. Elegant style tool for Illustrator.
CONS: FreeHand package is solid overall but not quite as compelling.
INFO: $99.95; upgrade, $49.95. Extensis: 800-796-9798 or 503-274-2020; 503-274-0530 (fax); http://www.extensis.com/.

VectorTools for FreeHand has some extra text tools, such as VectorCaps (shown here) and VectorType, which gives you character-level control over text.

improve as the driver software is brought up to snuff before the 3D Xplosion ships in late spring. The QuickDraw 3D-based game Havoc showed immediate benefit. It opened with a larger play window and displayed better textures than without acceleration — although they weren't as crisp as when running on a Mac equipped with an ATI Xclaim 3D.

This isn't surprising, since the PIX is a first-generation chip lacking the more advanced bilinear filtering and anti-aliasing features of the RAGE II chip on the Xclaim 3D. Such cards will outshine the PIX-based 3D Xplosion, but its bare-bones approach is a good way to add noticeable speed improvement at a very low price. */ JEFFY MILSTEAD*

PHOTOGRAPHY / GIAMPIERO BENVENUTI

Because its S-MOS PIX 3-D-graphics-accelerator chip has its own built-in PCI interface, the Microtech 3D Xplosion is the least crowded PCI card we've ever seen.

The Geek Beat

ISDN. Users of Sagem ISDN terminal adapters can leave the driving to software, thanks to a new version of Sagem's free PPP application that automatically allocates ISDN bandwidth based on the kind of work you're doing. When you're viewing a Web page, for example, the software might use only one of the two available ISDN B channels. Start downloading a large file, and the software automatically fires up the second B channel, doubling the available bandwidth. 408-448-8690; http://www.satusa.com/.

NETWORKING. Compatible Systems' WAN routers now support secure tunneling of AppleTalk and IPX via STEP (Secure Tunnel Establishment Protocol). With a Compatible Systems router in place at the corporate office, remote users can dial a local Internet service provider and connect to the corporate LAN via TCP/IP and tunneled AppleTalk or IPX. 800-356-0283 or 303-444-9532; http://www.compatible.com/.

Sonic Systems has added IPX support and the moniker *PRO* to its QuickStream remote-access server. $999; upgrade, $399. 408-736-1900; http://www.sonicsys.com/.

CROSS-PLATFORM. Orange Micro is shipping a 200-MHz Pentium card for PCI Macs (starting at $2,000); a 7-inch, Performa-oriented 100-MHz Pentium card ($799); and a version of Windows NT 4.0 ($278) for all the company's Pentium-based Macintosh coprocessor cards. 714-779-2772; http://www.orangemicro.com/.

INTERNET. WebSentinel, from Purity Software, is a Web-server plug-in and security application that extends the standard security realms and that features a Users & Groups-style interface. $99. 512-328-2288; http://www.purity.com/.

Pacific Coast Software's SiteGuard also gives Webmasters added realm security and maintains a database of users and groups that can be accessed remotely. $295. 619-675-1106; http://www.pacific-coast.com/.

DEVELOPMENT. Metrowerks has acquired The Latitude Group, maker of porting tools and libraries. Metrowerks intends to use Latitude's software to port CodeWarrior to Sun Microsystems' Solaris platform. Metrowerks: 800-377-5416 or 512-873-4700; http://www.metrowerks.com/.

Documentation for NeXT's OpenStep development environment is now available at http://www.next.com/Pubs/Documents/Download/. */ SHELLY BRISBIN*

WebSentinel's Users & Groups metaphor allows administrators to limit access to Web pages, directories, and Web-hosted databases.

NEW & NOTABLE

miroMOTION DC30. This digital-video PCI card transfers data at rates of up to 6 MB per second for processing full-frame NTSC and PAL video and can handle 16-bit stereo audio at up to 44.1 kHz. It comes with Adobe Premiere 4.2 and Kai's Power Goo SE. $999. miro: 800-249-6476 or 415-855-0955; http://www.miro.com/.

▼ X<>POSE. This "visual sampler" software lets you use your MIDI or Mac keyboard to display PICT images and QuickTime movies, apply digital-video effects, and sync visuals to audio on the fly. $399. Steinberg North America: 818-993-4161; http://www.steinberg-na.com/.

Video SpiceRack. Use this collection of more than 300 digital-video transitions and effects in Adobe Premiere, After Effects, Media 100, and Pinnacle Systems Genie Fusion. $179. Pixélan Software: 360-647-0112; pixelan@aol.com.

Touch-3D 2.0. New 3-D-modeling tools, support for QuickDraw 3D's 3DMF format, and expanded drawing and editing tools mark this upgrade to Lundstrom Design's 2-D/3-D modeling and "unfolding" software. $395. PaXar Technologies: 800-260-0905 or 250-474-8975; http://www.csbcomp.com/paxar/home.html.

ReadMarc. Identify digital "watermarks" in Adobe Photoshop and CorelDRAW images with this free reader, and use the resulting ID number to get artist information via the MarcCentre locator on Digimarc's Web site. Free download. Digimarc: 800-344-4627 or 503-223-0118; http://www.digimarc.com/.

Microtech CompactFlash. These ATA flash-memory cards for use in digital cameras and PDA organizers come in capacities of 2 to 15 MB. Each includes an adapter with a 68-pin connector for standard Type II PC Card slots. $20 to $30 per megabyte. Microtech International: 800-220-9488 or 203-468-6223; http://www.microtechint.com/.

HP DesignJet 2000CP and 2500CP. These new high-capacity printers use two ink systems (dye-based and pigment-based) to produce photo-realistic output on various types of paper, film, and substrates, up to 3 x 150 feet. DesignJet 2000CP, $9,995; DesignJet 2500CP, $11,995. Hewlett-Packard: 800-752-0900 or 415-857-1501; http://www.hp.com/. / *BROOKE C. WHEELER*

FIRST LOOKS

Epson Stylus Color 800: Stunning 1,440-dpi print quality.

MacUser LABS

IT'S NOT EASY TO IMPRESS the jaded imaging experts here at MacUser Labs, but those crafty Epson engineers have done it — big-time. Simply put, the prerelease Epson Stylus Color 800 inkjet printer we tested can produce prints that are nothing short of astonishing.

For a mere $449, you can print 1,440-x-720-dpi photo-quality output that rivals, to all but the most discerning eyes, images from dye-sublimation printers costing well over $10,000 each. Seriously. To get the best output, however, you must use Epson's special Glossy Film media, which runs a hefty $31.99 for 15 sheets. If you don't want jaw-dropping quality, you can use the company's Glossy Paper stock, which runs $12.95 for 20 sheets, or Photo Quality coated paper at $12.95 for 100 sheets. At 720 x 720 dpi on these media, output quality scales down to merely wonderful.

What's more, the Stylus Color 800 does a bang-up job of printing text at 360 x 360 dpi on common, low-quality xerographic paper, with few of the telltale jaggies so commonly produced by inkjet printers — and with none at all when printing on better media.

PROS: Extremely high-quality color and monochrome output.
CONS: LocalTalk and Ethernet cards are expensive options.
INFO: $449. Epson America: 800-463-7766 or 310-782-0770; http://www.epson.com/.

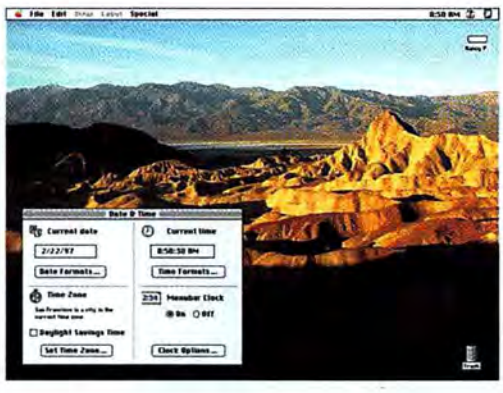
All image processing takes place on your Mac, which connects to the Stylus Color 800 either through its serial port or through an optional LocalTalk ($149) or Ethernet ($499) card — and, no, that astronomical Ethernet-card price is not a misprint. A PostScript Level 2 software RIP will be available soon.

Although printing speed is highly dependent on your Mac's horsepower, Epson claims rates of "up to" 8 pages per minute for printing in monochrome and "up to" 7 pages per minute for printing in CMYK color. Our prerelease printer, however, never achieved these lofty goals. It's faster than its Stylus Color predecessors (and its new 1,440-x-720-dpi sibling, the $299 Stylus Color 600), but the Stylus Color 800's highest-quality output takes time — lots of it. / *RIK MYSLEWSKI*

PHOTOGRAPHY / GIAMPIERO BENVENUTI

THE OFF BEAT

Desktop Picture Window



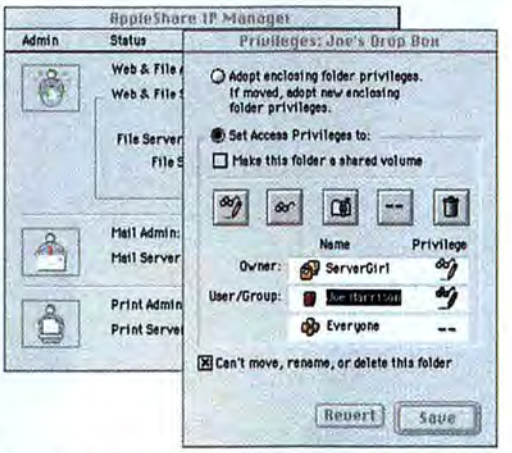
WATCH CLOUDS FLOAT over Mount Whitney or see the sun set behind Yosemite Valley simply by installing Sundial ($29.95 list), from John Neil & Associates. Sundial is a time-lapse QuickTime movie that fills up your entire Mac desktop and updates about every five minutes — it does tie up your Mac while it updates, due to the current Mac OS' lack of preemptive multitasking. Over the course of the day, you can see the sun rise and set in any one of ten 640-x-480-, 832-x-624-, or 1,024-x-768-pixel scenes. Once the Mac/NeXT hybrid OS is released, Sundial should be as unobtrusive as it is spectacular. $29.95. John Neil & Associates: 800-663-2943 or 415-905-3000; http://www.jna.com. / *NANCY PETERSON*

AppleShare IP 5.0:

Versatile package serves to satisfy.

TCP/IP IS EVERYWHERE these days — except, oddly, in the Mac's venerable file- and print-server software, AppleShare. But AppleShare IP 5.0, due in the first half of 1997, will finally fix that and provide other new features as well.

We took a close look at the beta version, available at http://appleshareip.apple.com/. The complete package is bursting with new applications and improvements, but we'll wait to test a bug-free final version before we decide whether or not AppleShare IP 5.0 is robust enough to woo back Mac-server administrators who have been lured into the Wintel world by NetWare or Windows NT.



From the AppleShare IP Server Manager, you can launch all five server functions and assign access privileges for server folders or volumes, just as you do with file sharing.

AppleShare IP 5.0 includes software for five types of servers: file-sharing, FTP, Web, e-mail, and print; you enable only the applications you need. The Web- and FTP-server software requires TCP/IP, the print-server software is AppleTalk-only, and the file-sharing- and e-mail-server software use AppleTalk or TCP/IP. All share a central Users & Groups file and are managed with linked administration tools. AppleShare IP 5.0 requires both System 7.5.5 or later and OpenDoc — a combination that accounts for its 32-MB RAM requirement.

TCP/IP AT LAST

The most revolutionary component of the new suite is AppleShare TCP/IP file sharing. To connect to a server via TCP/IP, each user needs AppleShare Workstation 3.7 (included in the server-software package). The Workstation client software displays servers in the Chooser as before, but it also has a field for the server's IP address.

You can mount server volumes via AppleTalk or TCP/IP without needing to specify on the server which protocol users will use — just set up users and shared volumes as you would on an AppleTalk-only server. The procedure's simplicity belies the significant value of TCP/IP-based file sharing: IP file transfers are frequently faster than AppleTalk transfers.

The e-mail-server software, Apple's first since the ill-fated PowerShare, supports APOP authentication and is MIME-compliant. Based on the POP standard, it lets anyone with a POP-compatible client (Mac or PC) retrieve mail.

The Web- and FTP-server software, like most other Macintosh-based types, supports standard CGI (Common Gateway Interface) applications. You protect Web directories in the same way as you do AppleShare folders, with passwords. FTP purportedly works in the same way but was disabled in the early February beta version we tested — as was the print-server software.

Server administration and drive/folder sharing follow the same familiar AppleShare process, with user and group maintenance for all servers. User accounts can be imported from older versions of AppleShare. If you delete a user, the software now asks whether you want to transfer the access privileges to another user or to add a new one.

TOO SOON TO TELL

AppleShare IP 5.0 delivers features Mac network administrators have been wanting and confirms Apple's reputation as a developer of complex yet user-friendly software. Although the slow, unstable beta version we tested may sound a cautionary note for eager network managers, we must wait until AppleShare IP 5.0 officially ships to find out if Apple engineers can successfully exterminate all the bugs. */ SHELLY BRISBIN*

PROS: Full-featured server software with intuitive user interface. TCP/IP-based file transfer.
CONS: No remote-administration tools.
INFO: Pricing not set at press time. Apple Computer: 800-538-9696 or 408-996-1010; http://appleshareip.apple.com/.

MACINTOSH PRICE INDEX

THE UNITED COMPUTER EXCHANGE index reflects average sales prices of new and used Macs as of February 3, 1997. Prices (other than those for compact models, Performas, and LCs) do not include a monitor or a keyboard. The United Computer Exchange is a national clearinghouse of used microcomputer equipment.

MAC MODEL	NEW	USED
Classic II (4/40)	•	$215
LC III (4/80)	•	$175
Performa 5215CD (8/1GB)	•	$1,060
Performa 6220CD (16/1GB)	•	$825
IIsi (5/80)	•	$175
IIci (4/80)	•	$200
IIfx (4/80)	•	$250
Quadra 610 (8/160)	•	$400
Quadra 630 CD (4/250)	•	$475
Quadra 650 (8/230)	•	$525
Quadra 800 (8/230)	•	$800
Quadra 840AV (8/230/CD)	•	$950
Quadra 950 (8/230)	•	$875
Power Mac 6100/66 (8/350/CD)	•	$650
Power Mac 7100/80 (8/700/CD)	•	$875
Power Mac 7200/90 (8/500/CD)	•	$975
Power Mac 7500/100 (16/1GB/CD)	•	$1,275
Power Mac 8100/100 (16/1GB/CD)	•	$1,250
Power Mac 8500/120 (16/2GB/CD)	•	$1,825
Power Mac 9500/132 (16/2GB)	•	$2,175
PowerBook 165c (4/80)	•	$700
PowerBook 180 (4/120)	•	$675
PowerBook 190cs/66 (8/500)	•	$1,000
PowerBook 520c (4/160)	•	$950
PowerBook 540c (4/320)	•	$1,325
PowerBook 5300cs 100 (8/500)	•	$1,500
Duo 250 (4/200)	•	$550
Duo 280c (4/320)	•	$875
Duo 2300c/100 (8/750)	$1,499	$1,175
Power Computing Power 100 (16/1GB/CD)	•	$825
Power Computing PowerWave 604/150 (8/1GB/CD)	•	$1,650

• = discontinued model

For more pricing information on these and other models, call 800-755-3033 or 770-955-0569 or visit http://www.uce.com/. And find it on ZD Net, in Library 1 (Special Reports) of the MacUser Forum (GO ZMC:MACUSER).

MACUSER UTILITY OF THE MONTH

Monkey See & Do

NO, IT'S NOT FRENCH for "my key chain." MonKeyChain is an exclusive *MacUser* utility that brings back one of the most convenient features of PowerTalk: the Key Chain. Simply add the user name and password of any network server or even any password-protected URL or FTP site to MonKeyChain's list, and it remembers — and encrypts — them for you, storing server or generic URL or FTP icons on a floating palette. All you will ever need to enter after that is MonKeyChain's password.

Written by Darryl Payne, MonKeyChain is available free, beginning March 30, exclusively from *MacUser*'s Software Central on the Web (http://www.zdnet.com/macuser/software) and CompuServe (GO ZMC:MACUSER). */ PHILIP DYER*

REVIEWS

PowerTools Infiniti 3240 Power ★★★★

PowerTools Infiniti 4200 Pro ★★★★

New clone vendor fuels price/performance wars.

MacUser LABS **UNHERALDED STARTUPS** and big-name brands are both essential to a healthy computer-clone industry, so the arrival of relative unknown PowerTools Systems in the Mac-clone arena marks another step in the development of the Mac OS-compatible hardware market. The company, established just over a year ago to market clock-chip accelerators, has now added a full line of Mac OS systems, which it calls the Infiniti series. These systems don't deliver features or performance you can't already get from other vendors, but they have low prices and offer exceptional flexibility.

The Lineup

The Infiniti line ranges from a bare-bones box that costs only $999 to a decked-out video-production system listing for $4,499. The systems are all based on Tanzania logic boards, built by Motorola — the same board used in Motorola's own StarMax systems, APS Technologies' M•Power line, and Apple's new Power Mac 4400.

Like other current Tanzania systems, the Infiniti models have PowerPC 603e or 604e processors soldered onto the board. Three EDO (extended data out) DIMM sockets can hold up to 160 MB of RAM total; there's also a slot for a Level 2 cache and another that can hold 2 or 4 MB of video RAM.

On the back, you'll find most of the usual Mac ports, with a few important exceptions: Ethernet is not built in, and instead of Apple's DB15 monitor port, you get a PC-standard SuperVGA connector. That makes it easy to plug in multisync monitors from Windows-oriented vendors, but it means you'll need an adapter to use a monitor designed for the Mac. (And that's only with multisync monitors — most older, fixed-frequency Mac monitors won't work at all.) On the plus side, you get PS/2 keyboard and mouse ports, which let you connect PC input devices, and you get a single ADB connector.

As for size and shape, PowerTools' only option is a tower case with a 200-watt power supply, five PCI slots, and bays for up to four 3.5-inch drives and three 5.25-inch drives.

PowerTools launched the Infiniti line with a series of stripped-down models targeted at dealers, VARs, corporate buyers, and power users — anyone, in short, interested in configuring systems with components of their choosing. Consisting of nothing but the logic board, floppy drive, power supply, and enclosure, such systems are known as 0/0 configurations, but for accuracy's sake, there ought to be more zeroes: They come not only without memory and hard drive but also with no CD-ROM drive, Level 2 cache, video RAM, keyboard, mouse, or Mac OS.

Currently, PowerTools offers four configurations: The three 603e-based boxes — the Infiniti 3180, 3200, and 3240, with 180-, 200-, and 240-MHz processors, respectively — go for $999, $1,099, and $1,299, respectively. The Infiniti 4200, with a 200-MHz 604e, is $1,499. Do the arithmetic carefully — the prices look appealingly low, but unless you already have the missing pieces on hand, you might come out ahead buying a more fully configured package.

That doesn't necessarily mean going to another vendor, though: PowerTools also offers several predefined package deals, which include an 8x CD-ROM drive, extended keyboard, mouse, Mac OS 7.6, and other features. The Smart bundle, for example, consists of an Infiniti 3180 with 16 MB of RAM, a 2.5-GB EIDE hard drive, 2 MB of VRAM, and a 256K L2 cache, for $1,599; the Elite bundle combines the Infiniti 4200 board with the same hard drive plus 32 MB of RAM, a 4-MB video

REVIEWS RATING KEY	
★★★★★	OUTSTANDING
★★★★	VERY GOOD
★★★	ACCEPTABLE
★★	POOR
★	SERIOUSLY FLAWED
💣	DANGEROUS

PHOTOGRAPHY / STEVEN UNDERWOOD

card, a 512K cache, a 33.6-kbps fax modem, and speakers, for $2,998.

The latest additions to the line are two desktop video-production systems. The Infiniti 3200 dVp, priced at $2,449, includes a 200-MHz 603e processor, 32 MB of RAM, a 3.2-GB EIDE hard drive, an 8x CD-ROM drive, a 512K L2 cache, 4 MB of SGRAM (synchronous graphics RAM — a fast form of video memory), a miroMOTION DC-20 digital-video card, and limited editions of Adobe Photoshop and Premiere. The Infiniti 4200 dVp combines all the same features with a 200-MHz 604e processor and a StreamLogic JackHammer Fast Wide SCSI card driving a striped pair of 2.1-GB Fast Wide Seagate Barracuda drives — in addition to the 3.2-GB EIDE drive — for $4,499. And if you don't like any of the bundle deals PowerTools offers, you can design your own custom configuration.

One apparent drawback to the Infiniti line — in common with all Tanzania systems — is the lack of a CPU-upgrade path. PowerTools has neatly sidestepped the problem, however, by promising to offer complete logic-board upgrades with faster processors. The company said that it expects these boards to cost no more than CPU daughterboards for other Mac OS systems, and so far it appears to be living up to its claim: It's already shipping Tanzania upgrade boards priced from $499 to $899, depending on processor speed.

Put to the Test

Using MacBench 4.0, we tested the speed of two PowerTools models, the Infiniti 3240 Power and the Infiniti 4200 Pro, and we were pleasantly surprised by what we found. The 3240 outperformed two other 240-MHz 603e systems — Power Computing's PowerBase 240 and UMAX Computer's SuperMac C600/240 — on all tests except the Floating Point test, where for some reason the Infiniti system fell far short. On MacBench's Processor test, the Infiniti 3240 Power placed almost 25 percent ahead of the other two systems.

That matchup wasn't exactly fair, however, because the 3240 (configured as in PowerTools' $2,499 Power bundle) had a 512K L2 cache — twice as much as the competing systems — and Mac OS 7.6, which significantly improves scores in MacBench 4.0's Processor test. With the Infiniti 4200 (configured as in the Pro bundle), also $2,499, we had a more even playing field: The 200-MHz 604e systems we compared — Motorola's StarMax 4000/200 MT and APS' M•Power 604e200 — at least had L2 caches of the same size (512K).

Again, the PowerTools system handily bested its rivals. Its 14-percent edge in the Processor test may be attributable to Mac OS 7.6, but there was no ambiguity about its huge lead in the Disk and Publishing Disk tests: The IBM DeskStar drive PowerTools puts in the Infiniti 4200 Pro simply blows away the Quantum drives APS and Motorola use.

Costing Them Out

We compared PowerTools' prices to those of APS in particular, since the two companies offer similar hardware via the same distribution model. In many cases, PowerTools' systems were appreciably, although not dramatically, cheaper than APS'; in other cases, APS offered fully configured systems priced a bit below PowerTools' packages with the same processor, but the PowerTools bundles included considerably more. Both PowerTools and APS provide one-year standard warranties requiring that defective equipment be returned to the factory for repair; both offer extended-warranty plans at extra cost.

The easy-open chassis on PowerTools Infiniti towers paves the way for logic-board upgrades.

The Bottom Line

Certainly, an element of risk is involved in buying from a small company with no real track record. Although the systems we tested appeared well made, the products haven't yet been through sustained real-life testing. On the whole, though, we liked what we saw. If you're looking for good prices, good speed, and plenty of configuration options, the Infiniti series is well worth consideration. / Henry Norr

PowerTools Infiniti 3240 Power with 240-MHz 603e, 32 MB of RAM, 3.2-GB hard drive, 512K L2 cache, $2,499; **PowerTools Infiniti 4200 Pro** with 200-MHz 604e, 24 MB of RAM, 3.5-GB hard drive, 512K L2 cache, $2,499; other systems, $999 and up (direct). **Company:** PowerTools Systems, Austin, TX; 512-891-0646; http://www.pwrtools.com/. **Reader Service:** Circle #401.

MacUser LABS HEFTING THE POWERTOOLS / how newcomer's systems rate against rivals'

We subjected two PowerTools Infiniti systems to our industry-standard MacBench 4.0 test suite to see how they fared against competing systems, and the results were encouraging: Thanks in part to Mac OS 7.6, which ships with the Infiniti systems (and which boosts MacBench Processor scores), the PowerTools systems compared favorably to the other systems. The tested systems were the Infiniti 4200 Pro bundle (200-MHz PowerPC 604e, 24 MB of RAM, 512K L2 cache, 3.5-GB hard drive, 8x CD-ROM drive, and 2 MB of VRAM) and the Infiniti 3240 Power bundle (240-MHz PowerPC 603e, 32 MB of RAM, 512K L2 cache, 3.2-GB hard drive, 8x CD-ROM drive, and 1 MB of VRAM). MacBench 4.0 scores are relative to those of an Apple Power Mac 6100/60 with a 30-MHz memory bus, a 250-MB hard drive, 2 MB of built-in graphics RAM, and no L2 cache. *MacUser's* Online CPU Report Cards contain complete and up-to-the-minute information on these and all other currently shipping Mac OS systems; they can be found on the MacUser Web Edition's New Mac Ratings page, at http://www.zdnet.com/macuser/cpu.

MACBENCH 4.0 SCORES

	PROCESSOR	FLOATING POINT	DISK	PUBLISHING DISK	GRAPHICS	LO-RES PUBLISHING GRAPHICS	CD-ROM
PowerTools Infiniti 4200 Pro	419	385	286	258	366	375	320
APS M•Power 604e200	365	385	147	162	366	354	280
Motorola StarMax 4000/200 MT	367	384	189	184	366	364	295
PowerTools Infiniti 3240 Power	374	181	240	234	306	314	340
Power Computing PowerBase 240	309	319	213*	175*	288	279	286
UMAX SuperMac C600/240	299	314	209*	219*	294	254	287
	SCORE BETTER	SCORE BETTER	SCORE BETTER	SCORE BETTER	SCORE BETTER	SCORE BETTER	SCORE BETTER

*Tests performed with virtual memory off.

Dual-Processor Systems

UMAX SuperMac S900DP/200 ★★★★½

UMAX SuperMac S900DP/250 RAID ★★★★

Two fast new systems make multiprocessing more affordable.

MacUser LABS **YOU'RE A LUNATIC** if you are a content-creating professional who hasn't invested in the most powerful Mac OS system you can afford. After all, if you're billing your customers by the job, you're losing money every second you sit idle.

The folks at UMAX want to help. They're offering two new dual-processor systems — the SuperMac S900DP/200 and S900DP/250 RAID — for speeding image-processing chores. Both are designed to speed the growing number of programs that take advantage of the Mac OS' MP (multiprocessing) abilities — applications such as Adobe Photoshop, Adobe After Effects, ElectricImage Animation System, MetaTools Studio Effects, Strata StudioPro, Canvas 5, and MediaCleaner Pro.

Both the S900DP/200 and the S900DP/250 RAID are based on the UMAX SuperMac S900 systems we recently reviewed (see "Mac OS Systems," January '97, page 33). The S900DP/200, in fact, is almost identical to the S900 604e/200; they both have 32 MB of RAM, an IMS TwinTurbo 128M graphics card with 4 MB of VRAM, and an 8x CD-ROM drive. (The S900 604e/200 has a 2-GB hard drive; the S900DP/200's drive holds 2.1 GB.) On the negative side, they also share the S900 systems' soldered-on 512K L2 cache and clumsy drive-covering plastic door. The big difference between them is that the S900DP/200 has an additional 200-MHz 604e microprocessor on a card installed in UMAX's unique second-processor slot.

With a street price of around $4,500, the S900DP/200 is the most cost-effective system we've seen for those joining the multiprocessing world. Even more interesting than the S900DP/200, however, is its beefier sibling, the S900DP/250 RAID. The specifications of this high-powered offering are truly impressive: 64 MB of RAM; an IMS TwinTurbo 128M graphics card with 8 MB of VRAM; a RAID array with two 2.1-GB IBM UltraStar Ultra SCSI drives; an 8x CD-ROM drive; an Iomega Zip drive; and UMAX's E100 PCI card, which provides Ultra SCSI as well as 100BASE-T Ethernet ports.

The crowning glories of the S900DP/250 RAID, however, are its two 250-MHz 604e microprocessors — the fastest chips in any Mac OS system we've tested to date. The S900DP/250 RAID is so chock-full of goodies that it's a fully configured content-creating workhorse right out of the box — no, make that a racehorse.

Our testing with MP-enabled Photoshop 4.0 and ElectricImage Animation System 2.7.5 showed it to hold its own against — and, in some cases, surpass — the four-processor DayStar Genesis MP 720+ running Photoshop 3.0.5 with Adobe's MP-enabling plug-in and a beta version of ElectricImage Animation System, which we tested for our recent MP-system roundup (see "Muscle Macs," January '97, page 76). Be cautioned, however, that Photoshop 3.0.5 and Photoshop 4.0 are very different animals with different performance characteristics (see the Adobe Photoshop 4.0 review, March '97, page 38).

The Bottom Line

It used to be that if you were an image-processing professional, you could afford only one of the two best ways to create a high-speed system: a ton of RAM or a multiprocessor system. Times have changed: RAM is dirt cheap, DayStar has slashed the prices of its pioneering Genesis MP line, and now UMAX has released the SuperMac S900DP/200 and S900DP/250 RAID. So what are you waiting for? / Jeffy Milstead and Rik Myslewski

The UMAX SuperMac S900DP/200 and S900DP/250 RAID offer outstanding price/performance.

UMAX SuperMac S900DP/200 with 32 MB of RAM, 2.1-GB hard drive, 8x CD-ROM drive, and 4 MB of VRAM, $4,500; **UMAX SuperMac S900DP/250 RAID** with 64 MB of RAM, dual 2.1-GB RAID, 8x CD-ROM drive, Zip drive, and 8 MB of VRAM, $7,500 (estimated street). **Company:** UMAX Computer, Fremont, CA; 800-286-6186 or 510-651-4000; http://www.supermac.com/. **Reader Service:** Circle #402.

MacUser LABS

DOUBLE YOUR PLEASURE / twice the processors, not twice the performance

A dual-processor system boosts the performance of applications that have been MP-enabled, but don't expect two processors to give you twice the speed — there are simply too many other factors involved, such as the efficiency of the MP-enabled application, the overhead of the OS and its MP-enabling extensions, and such nonprocessing factors as hard-drive speed. Even with these limitations, however, the new UMAX SuperMac systems performed impressively on various Photoshop and ElectricImage Animation System tasks. Each system had 256 MB of RAM, and Photoshop was allocated 192 MB of RAM. We used a 50-MB image in Photoshop testing; the ElectricImage Animation System test frame was 2.8 MB and included 68,712 active facets with volumetric smoke and 29 textures.

	ROTATE .3 DEGREES	FEATHER SELECTION	UNSHARP MASK (2.3-PIXEL RADIUS)	GAUSSIAN BLUR (2.3-PIXEL RADIUS)	MODE CHANGE RGB TO CMYK	RESIZE 50 PERCENT	ELECTRICIMAGE CAMERA RENDER
UMAX SuperMac S900DP/250 RAID	23.8	8.6	22.6	19.6	14.2	16.3	92.8
UMAX SuperMac S900DP/200	27.0	9.5	25.6	21.0	17.8	17.2	113.6
REFERENCE SYSTEMS							
Apple Power Mac 9500/180MP	28.8	9.6	25.6	22.2	18.5	18.1	124.6
Apple Power Mac 9500/200	38.2	11.7	34.5	28.8	28.3	20.9	194.3
	SECONDS SLOWER	SECONDS SLOWER	SECONDS SLOWER	SECONDS SLOWER	SECONDS SLOWER	SECONDS SLOWER	SECONDS SLOWER

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BYTE Best of Class Winner Best Application Software

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Windows Magazine

PC Computing ★★★★

DENEBA

Symantec Visual Café for Macintosh

3½

Powerful new Java tool stumbles, through no fault of its own.

IF YOU'RE CRAVING A JOLT of Java but don't want to arm-wrestle with compilers and syntax errors, check out Symantec Visual Café for Macintosh, a full development environment for creating Java applications and applets via point, click, and drag. But be advised: Although this approach has several benefits, it's not the best choice for everyone.

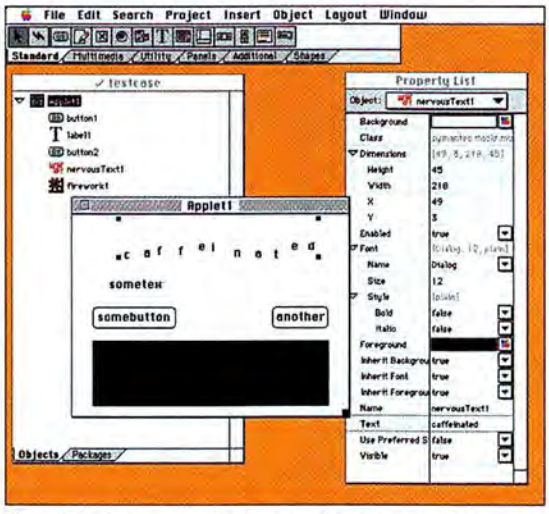
First, don't confuse Visual Café with Café for Macintosh. The latter is Symantec's traditional, source-code-oriented integrated development environment, which would appear quite familiar to users of Symantec's C/C++ development system. Visual Café runs only on PowerPC Macs and is geared toward the creation of Java-based user interfaces for stand-alone Java applications as well as for Web-based delivery as Java applets.

Visual Tools

Visual Café is a full-fledged integrated development environment (IDE) that uses a project metaphor similar in concept to that of other IDEs — but the similarity to conventional development tools ends there. Instead of listing the various source files that constitute the final software, Visual Café project files show, in a hierarchical view, the various user-interface elements that make up the final Java applet or application. For example, an applet's window can contain buttons, labels, data-entry fields, and other bits and pieces, visible in a Finder-style collapsible outline view.

Creating a user interface (UI) with Visual Café is easy. Once the backdrop of a UI, typically a window or a frame, is defined, positioning elements is a straightforward matter of selecting them from the tool palette and then placing them within the window or frame. After the elements are in place, Visual Café allows you to create relationships, such as actions that happen as a result of a button click, among the elements — it just takes a bit of clicking and dragging, often with no manual coding at all.

Mac developers typically use graphical tools and a resource editor such as ResEdit or Mathemaesthetics' Resorcerer for creating windows and dialog boxes. However, there is no standard resource format for Java. All the UI elements created with Visual Café are actually Java code. Although many standard user-interface elements, such as buttons and labels, are part of Sun Microsystems' standard Java class library, some of the more complex elements offered by Visual Café are supplied as prefabricated Java class files. When you're creating Java applets, these class files must be placed in a directory on the same Web server as the applets themselves.



Visual Café, Symantec's new graphical Java-applet-creation environment, includes simple point-and-click element-characteristic controls and tools that make it easy to build interfaces.

One drawback of the lack of a standard Java resource format is that the Visual Café development environment for making user interfaces is not — and cannot be — truly WYSIWYG, since each Java VM (*virtual machine,* the software engine built into Web browsers that actually executes the Java applets) provides a different version of the standard user-interface elements. Even when you compare the look of a simple Java applet running under Symantec's VM with the same applet running under Netscape's VM, differences are immediately visible.

Although Visual Café's drawing-style tools allow you to create applets without writing a single line of code, the code Visual Café itself generates is accessible and editable. Care must be taken when editing these files directly, however, since further changes made with Visual Café can obliterate any manual changes. This issue highlights one of Visual Café's problems: documentation.

Instructions Not Included

Visual Café comes on a CD-ROM, accompanied by a pamphlet of minimal installation instructions. After you've installed the software from the CD-ROM, no other documentation is immediately evident. Further exploration reveals a comprehensive Apple Guide that contains a great deal of useful information, in the typical bite-sized amounts for which Apple Guide was designed.

A rich development tool such as Visual Café needs good documentation, for novices as well as for professionals who might be unfamiliar with this particular environment. Although development-tool documentation, especially frequently used references, can be more useful in searchable electronic form, some documentation, such as tool references or tutorials, is considerably more useful in paper form. Although Symantec seems to be delivering the missing documentation piecemeal on its Web site, this product should not have shipped without it.

Visual Café also suffers from a limitation that's not Symantec's fault: Its Java component, including the Java VM, is based on Sun's Java Development Kit (JDK) 1.0.2, whose Mac version is notoriously slow and fraught with problems. And although Symantec's adaptation of the Sun tool set is usable, it lacks support for more-advanced Java technologies, such as database-connectivity software, that are already available for Windows and UNIX platforms.

The Bottom Line

Visual Café for Macintosh shows great promise, but it suffers from teething problems common to 1.0 products. Once its initial issues have been resolved and Java on the Mac has matured, Visual Café should become a worthwhile addition to your Java-development tool set, especially if you're primarily interested in constructing Java-based forms and user interfaces with a minimum of hand coding.

/ Stephan Somogyi

Symantec Visual Café for Macintosh 1.0, $99.95 (list).
Company: Symantec, Cupertino, CA; 800-441-7234 or 408-253-9600; http://www.symantec.com/cafemac/.
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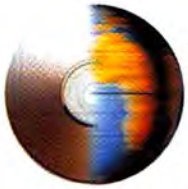

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Ziff-Davis Benchmark Operation, 1001 Aviation Parkway, Suite 400, Morrisville, NC 27560

NetObjects Fusion

3½

Clumsy interface mars powerful Web-site-creation tool.

LONG-SUFFERING DESIGNERS of Web sites have anxiously awaited NetObjects Fusion, a Web-site-layout program that cleverly gets around the limitations and intricacies of HTML. The program lets you design Web pages by arranging objects on a page grid, just as you would in Adobe PageMaker or QuarkXPress. Perhaps even more compelling, Fusion lets you create, manage, and update entire Web sites. For all its power and convenience, however, Fusion suffers from its lack of support for Mac-standard interface conventions.

Taming HTML

HTML wasn't designed with snazzy page designs in mind. If you want to create lively, graphical layouts with HTML, you have to embed text and graphics within tables, a difficult process even with the help of a visual HTML editor such as Adobe PageMill 2.0. Fusion takes a different tack: It looks at where you've placed your text and graphics on a page-layout-style grid and then generates exact table definitions, saving you time and brain power.

At first glance, Fusion looks a lot like print-based page-layout programs. You have a pasteboard, complete with a layout grid and a tool palette. The palette includes tools for placing and manipulating text and pictures and adding sound, Java applets, browser plug-ins, interactive form fields, buttons, and menus. Once placed, any of the items can be dragged anywhere on a Fusion page — except that objects can't overlap: That's one limitation of HTML that even Fusion can't get around.

However, Fusion also has the feel of a program incompletely ported from Windows. Most noticeably, it doesn't support standard Mac conventions for editing text. To make selected text bold or italic or to adjust text alignment, you have to click on icons in a floating palette. Equally bizarre, double-clicking on the Fusion application's icon brings up a New Site dialog box, and if you click on the Cancel button, the application will quit. If you want to open a site you've created, you must either double-click on its icon or create a blank site from the New Site dialog box and then open your existing site. Fusion has only one window, which must be open at all times, another vestige of its Windows 95 roots.

We also missed some of PageMill's features, such as the ability to create a horizontal rule with one button click; in Fusion, you have to painstakingly draw a straight line with the drawing tool. We found Fusion slow at times too, even on a relatively speedy Power Mac.

A Site to See

Perhaps even more compelling than Fusion's page-layout metaphor is its ability to create and maintain not just pages but also entire Web sites. Fusion's site view lets you organize your Web site's pages by using either a tree metaphor or an outline. You can drag and drop pages anywhere in the hierarchy. Also, Fusion can automatically generate running navigational headers and footers, either as text hyperlinks or linked buttons, for every page of your site.

Fusion comes with 50 site styles containing coordinated banner graphics and navigational buttons; you can also import graphics to create your own site styles. Once you've selected a site style, Fusion will automatically generate banner and navigational text and place it on the graphical elements, thereby creating a site that appears custom-built but saving you hours of text and GIF editing — although we weren't pleased that Fusion doesn't anti-alias the text it generates.

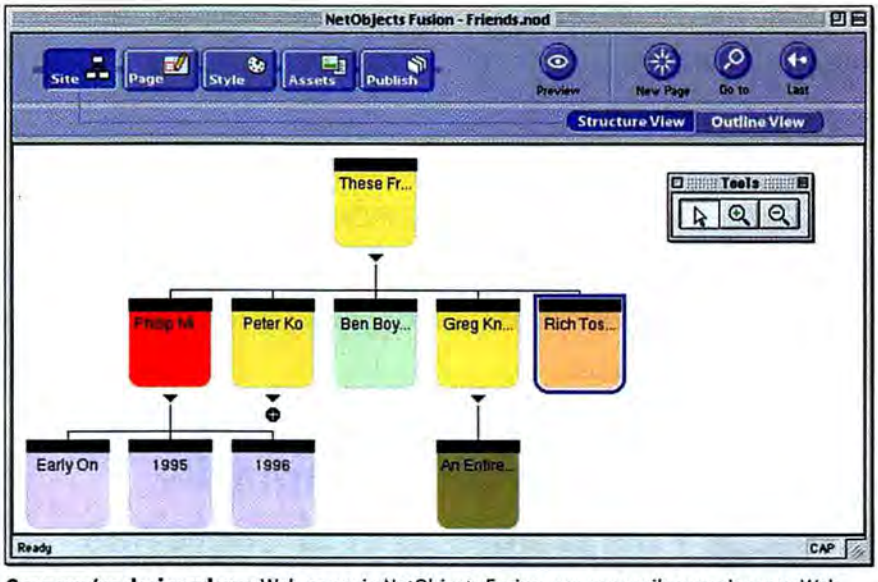
Fusion keeps track of all the pages of your Web site, so if you move a page around in the site hierarchy, all the links to that page will be updated automatically. However, unlike the upcoming revision of Fusion's Windows version, Fusion for the Macintosh isn't capable of importing existing Web sites, making converting to Fusion a difficult proposition for anyone already in charge of a large site. NetObjects says that site importing will be possible in Fusion's next Mac version.

Once your site has been created (or updated), Fusion can automatically upload all the files in your site to your Web server via FTP. After you've set up your server name, log-in name, and password, uploading your site to a temporary staging area or to your production server requires just one button click.

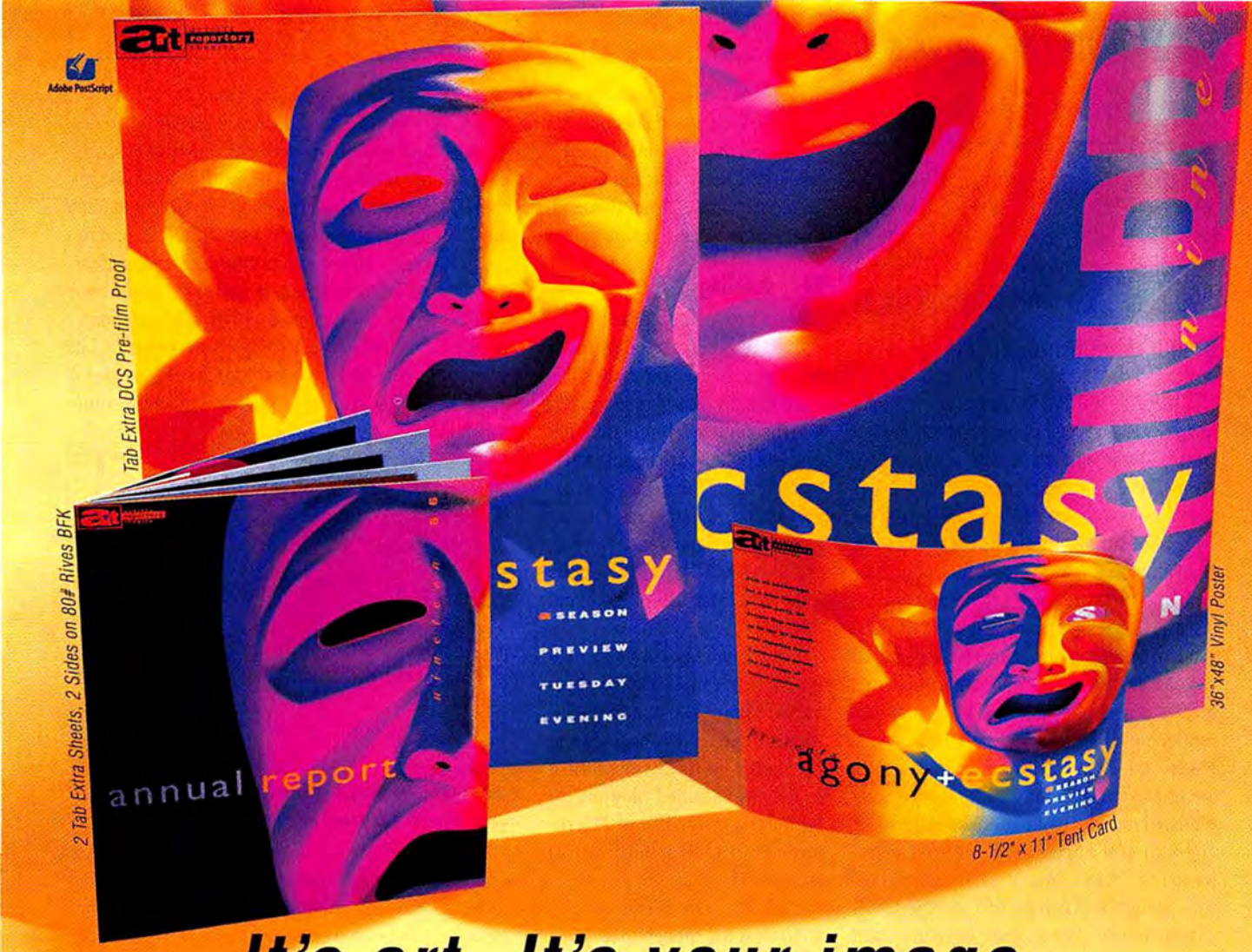
The Bottom Line

By eliminating the need to depend directly on HTML, Fusion has raised the bar for all other Web authoring packages. But Fusion is not without its limitations, chief among them the inability to import existing Web sites and a clunky interface lacking in the niceties we've come to expect from Mac applications. It's also a bit overpriced, given that most full-featured Web authoring tools are under $100. For site designers frustrated by the word-processor-like feel of other Web tools and a lack of site-management tools, Fusion is an intriguing product with a lot of potential — but it's not yet time to throw out your copies of PageMill and BBEdit. / Jason Snell

NetObjects Fusion 1.0, $695 (list). **Company:** NetObjects, Redwood City, CA; 888-482-3200 or 415-943-4048; http://www.netobjects.com/. **Reader Service:** Circle #411.



Once you've designed your Web pages in NetObjects Fusion, you can easily organize your Web site, using the program's graphical hierarchy window.



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CIRCLE **124** ON READER SERVICE CARD

Human Models

Fractal Design Poser 2.0 ★★★★

Life Forms 2.0 ★★½

Two packages offer different takes on human-form modeling.

THE HUMAN FIGURE IS infamously difficult to simulate on a computer, but both Fractal Design Poser and Credo Multimedia's Life Forms let you create and manipulate 3-D human figures with relative ease. Comparing the two, the more-realistic figures in Poser, coupled with a lower price and a solid, new animation engine, give it a definite edge.

Poser 2.0, a significant update to the first version of the program, offers keyframe-based animation, can import and export files in a greater variety of formats, and has improved rendering quality. The new human-body models, which include some clothed figures, are of excellent quality and have accurately rendered muscles and joints. You can replace any portion of a figure's anatomy with an imported 3-D object. Poser now also shows vanishing points and perspective lines, which let you accurately align a figure to an imported background image.

Body parts that are linked to another part of the body that's moving will likewise move and rotate; this type of hierarchical linking and inheritance of motion is called inverse kinematics. Poser figures also have limb constraints, which prevent joints from rotating or bending beyond what is realistic. Parameter Dials give you numeric control over figure geometry and position.

Fractal Design Poser 2.0 produces human 3-D models, including clothed figures, in a wide variety of body types.

Life Forms' models are much simpler: The highest level of detail possible is a wire frame. Posing Life Forms figures is as easy as it is in Poser, and the program also uses inverse kinematics. Limb constraints, however, are conspicuously absent, even though they're vital for positioning and moving human figures.

Body Building

Poser's rendering capabilities are robust enough to generate models and rough drafts you can enhance with better rendering and place in more-complex scenes with other objects in another 3-D program. You can specify the surface characteristics of figures as well as of whatever they're standing on. You can export Poser figures and their texture maps as 3DMF, DXF, Detailer text, RenderMan RIB, or Wavefront OBJ files.

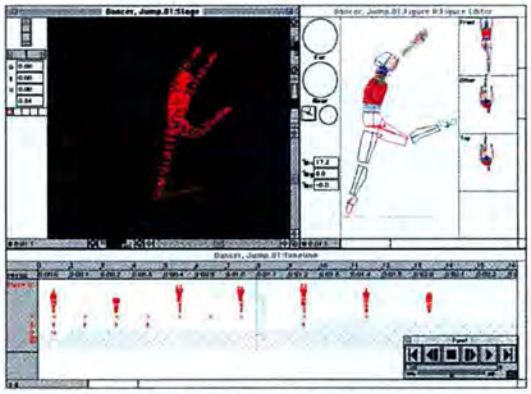
Rendering a Life Forms figure is quite fast, but all you can specify is the wire frame's color and resolution. You can render the figures in PICS, PICT, or QuickTime format or use the included plug-ins for Specular's Infini-D and Macromedia's Swivel 3D and Extreme3D to render the figures in a modeling program. Nonetheless, Life Forms' wire-frame forms aren't detailed enough to let you generate realistic models.

Poser has a simple keyframe-based animation system, which is great for basic human motion but which may leave experienced animators wanting more. There are no ease-in/out, curve-based motion or velocity controls, much less features for editing velocity or motion through nonlinear interpolation (which makes motion smoother and more realistic by simulating gradual movement). You can get nearly realistic movement, but you need the tighter controls of other 3-D-animation packages to achieve truly realistic motion.

Life Forms' keyframing techniques have little in common with those in other applications. For example, if the position (or geometry) of a character has changed from the previous keyframe, the change is indicated by tiny, difficult-to-decode thumbnails of the wire-frame character in the timeline. Life Forms lacks any real-time, interactive previews and doesn't have numeric controls that allow you to rotate or zoom its main camera/working view.

You can paste shapes, locations, attitudes, and notes from one keyframe to another, using the Paste Special command. Life Forms' motion palettes give you easy access to often used motion sequences, such as walk and run cycles, jumps, and tumbles. Poser has libraries for motion, too, as well as for poses, body types, and camera and light configurations.

Neither Poser nor Life Forms is perfect. Life Forms' speed is less than stellar. Poser doesn't let you scale its timeline window in time-



Credo Multimedia's Life Forms 2.0 uses a difficult-to-master interface to create wire-frame figures.

display increments large enough to accommodate long animations — this makes it difficult to see even a short sequence on a 17-inch monitor. You can create and see motion paths in either program, but they're strictly linear: There is no support for user-definable curve-based motion or velocity. Unlike in other animation programs, such as Adobe After Effects, the rotation controls in Poser and Life Forms can't produce anything greater than a single 360-degree rotation in a single step.

The Bottom Line

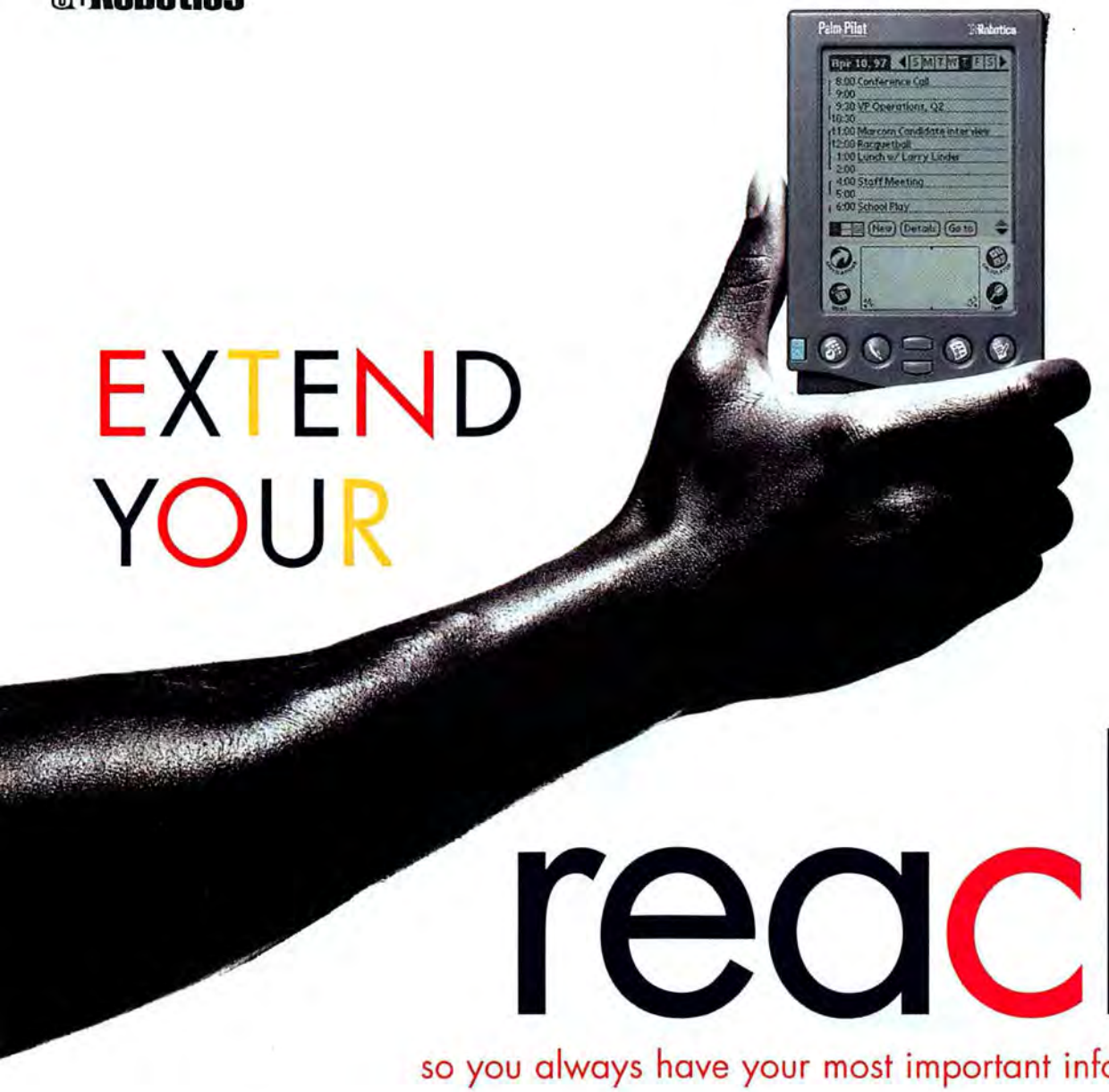
If you need to visualize human motion on your computer for choreography, say, and you don't need to model realistic human figures, Life Forms is an alternative to more-complex and more-expensive animation programs. By comparison, Fractal Design Poser's detailed models plus its new animation capabilities make it a winner hands (and feet) down.

/ David Biedny and Nathan Moody

Fractal Design Poser 2.0, $149 (list). **Company:** Fractal Design, Scotts Valley, CA; 800-846-0111 or 408-430-4000; http://www.fractal.com/. **Reader Service:** Circle #412.

Life Forms 2.0, $299 (direct). **Company:** Credo Multimedia Software, Burnaby, BC, Canada; 604-291-6717; http://fas.sfu.ca/lifeforms.html. **Reader Service:** Circle #413.

U.S. Robotics



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Nisus Writer 5.0

4½

Full-featured word processor bursts at the seams.

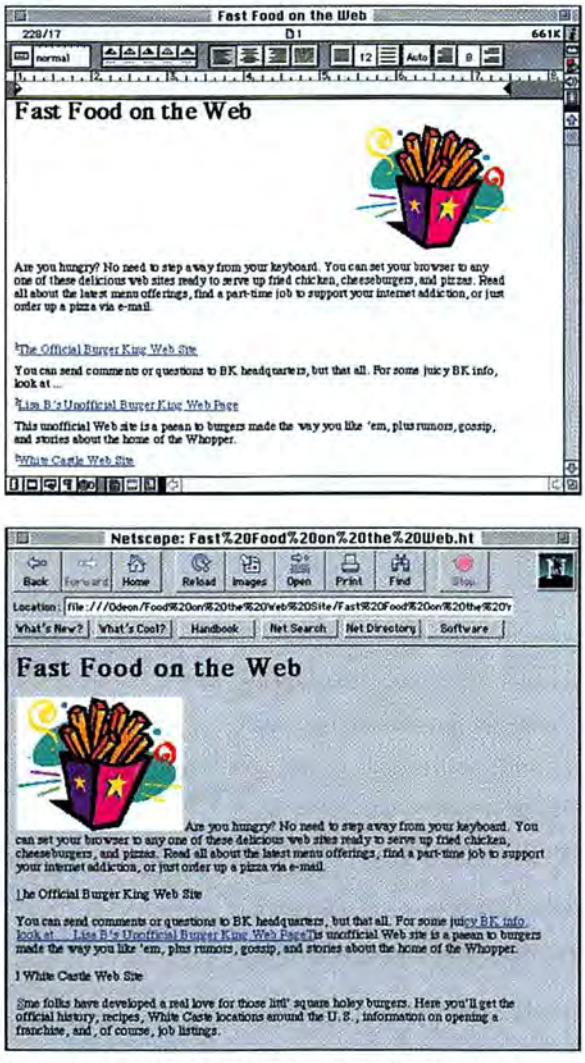
FOR THOSE WHO WRITE in Hebrew or need to type complex quadratic equations, Nisus Writer is an impressively nimble multifaceted, multilingual word processor. However, some of the new features of the latest version of this powerful program, notably its support for HTML, are surprisingly shaky.

Nisus Writer is the only Mac word processor that lets you select sections of noncontiguous text, so you can, for example, change the style of several important words at once. It also lets you set up (and now, save the specifications for) remarkably intelligent searches: For example, simply by choosing a few built-in commands in its PowerFind window, you can instantly change all the numbers in an outline to bullet points; furthermore, a powerful built-in scripting language lets you do even more-complex searches as well as automate many tasks and create basic multimedia presentations. Like most other high-end word processors, Nisus Writer lets you create style sheets, graphics, and tables and drop in sounds and QuickTime movies. It's also one of the few word processors that lets you write in multiple languages, including languages that read from right to left, and it now no longer requires an annoying dongle to work in non-Roman languages. (The sole exception is the Hebrew version sold in Israel.)

If you don't require many of its unique features, Nisus Writer's breadth of commands and functions can be dizzying, but Nisus Software has done a fine job of streamlining the program, making some commands available only when you need them. For instance, when you want to place a recorded sound bite in your document, you click on a small sound icon at the top of the right scroll bar. This brings up a ribbon with buttons for recording sound and adds a sound menu to the end of the main menu bar.

Nisus Writer avidly embraces Apple's technologies and includes support for AppleScript, publish-and-subscribe, Macintosh Drag and Drop — even the now defunct PowerTalk — so it's no surprise that the PowerPC version supports OpenDoc Live Objects, albeit imperfectly. Nisus Writer 5.0 ships with a handful of Live Objects you can embed into your documents, including the ubiquitous Cyberdog browser, Apple Live Objects Essentials, a Java tool, and a game.

The main appeal of the Live Objects technology is that it allows you to pick and choose just the features you need, so you don't end up paying in RAM for the copious feature set of an application such as Microsoft Word 6, to take an obvious example. But how well Live Objects complement Nisus Writer and vice versa remains to be seen. Nisus Writer has relatively low RAM requirements despite its many talents, and it's so full-featured that we have to wonder what independent Live Objects can offer. For example, you can create tables with titles, aligned text, and more, using Nisus Writer's built-in Table Tool. In comparison, the included demo of Corda Technologies' C-Table Live Object was underwhelming — and it didn't help that its tables had the annoying habit of floating above the text even when we had switched out of C-Table and were working within Nisus Writer.



In our testing, Nisus Writer 5.0.1 consistently mangled the conversion of a word-processed document (top) into an HTML document (bottom); reading the document in a Web browser revealed misplaced URLs and shifted graphics.

Missing Links

Nisus Writer's HTML features are even more of a disappointment. For example, to create a link on your Web-page-in-progress, you're required to enter URLs as footnotes to selected text or objects and then select the HTML Style called Link from the Style menu. The situation isn't improved any by the fact that Nisus Writer's documentation doesn't correspond to the application's actual HTML styles — and that even Nisus' own technical-support department wasn't able to tell us how to create HTML links. Even worse, when we saved documents with links and other HTML features as HTML (both as Nisus HTML and as WWW HTML), we consistently ended up with a hodgepodge of misplaced links, mangled text, and links that didn't make it to the HTML version at all. Nisus Writer is also supposed to be able to convert embedded graphics to GIF format automatically, but in our experience, it sometimes only created references to the graphics, as if they'd been converted, but didn't actually convert the graphics themselves.

The Bottom Line

Space doesn't permit us to cover all of the many excellent features that have been a part of Nisus Writer for years. Suffice it to say that this program is in a league of its own, especially for the linguistically inclined. Just don't count on it as a WYSIWYG Web authoring tool. / Carolyn Bickford

Nisus Writer 5.0.1, $199 (estimated street). **Company:** Nisus Software, Solano Beach, CA; 800-281-0101 or 619-481-1477; http://www.nisus-soft.com/. **Reader Service:** Circle #414.

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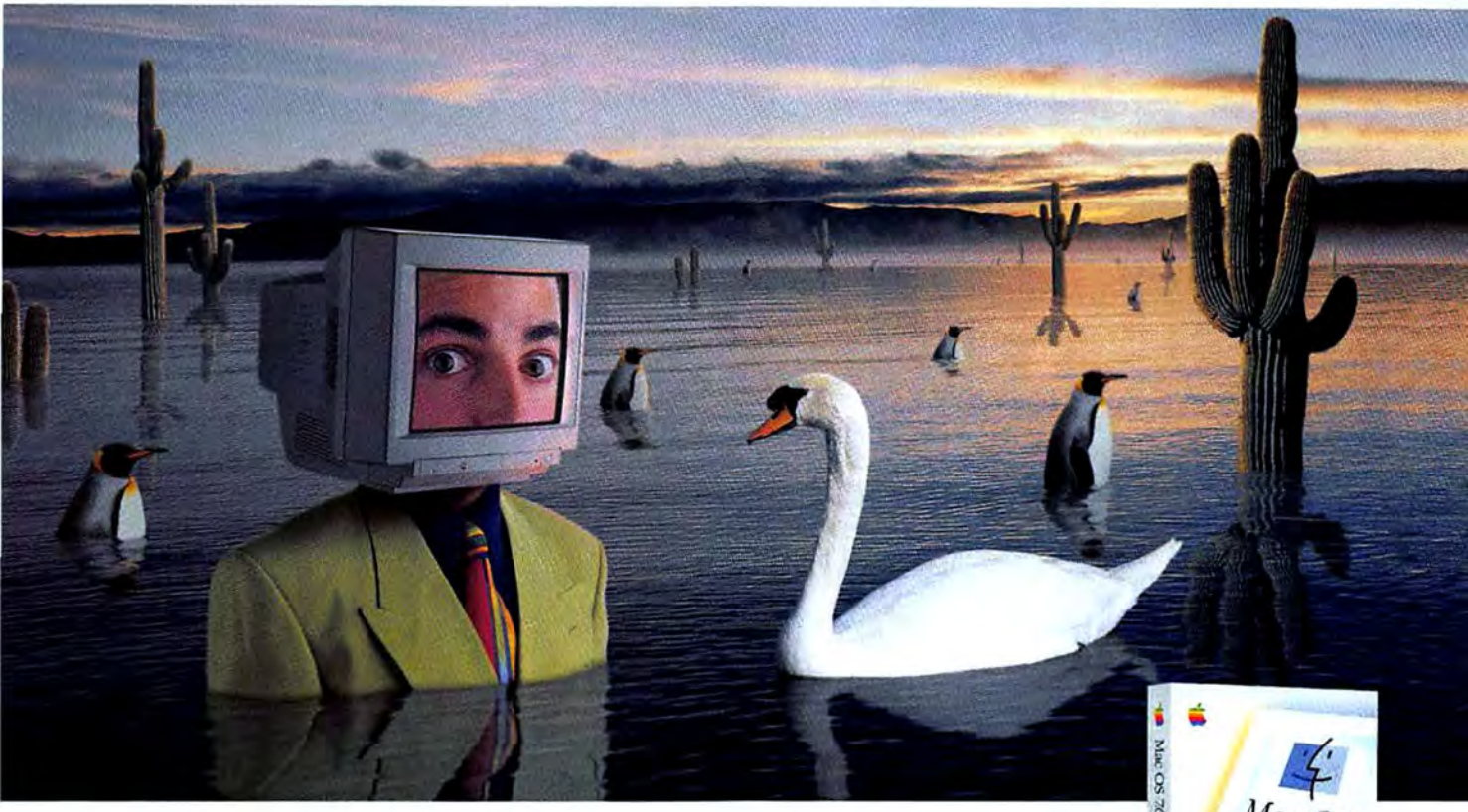

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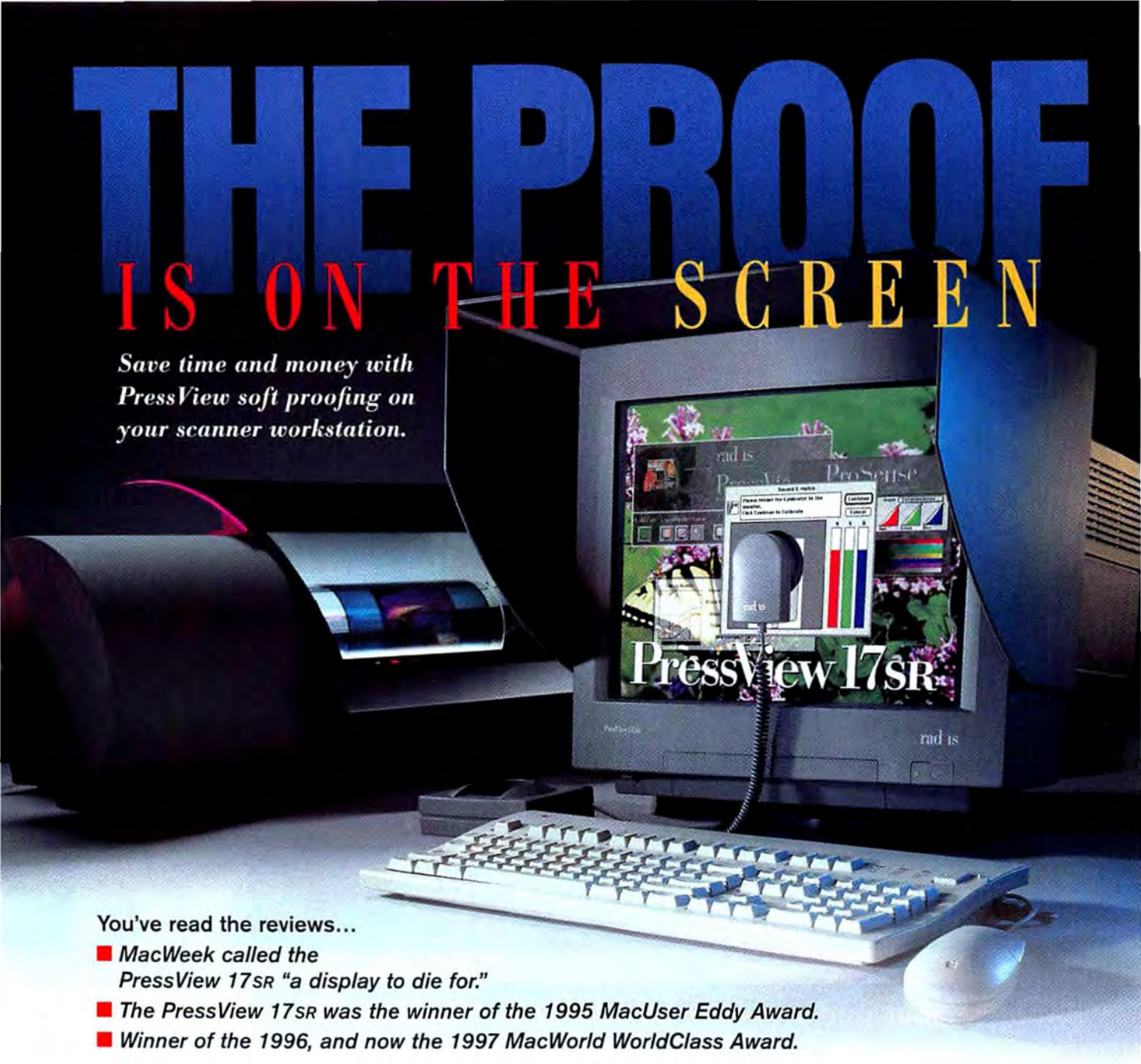

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WAV

3½

Word processor fulfills much of OpenDoc's promise.

OLD PROMISES ARE finally coming true: Products using OpenDoc, Apple's answer to Microsoft's OLE 2.0, are beginning to trickle into the marketplace. One of the slickest implementations of OpenDoc technology is the recently released WAV, an attractive, flexible word processor from Digital Harbor that offers an excellent, inexpensive introduction to OpenDoc.

OpenDoc itself may take some getting used to. You open not WAV per se but rather an OpenDoc document you modify with installed OpenDoc parts such as WAV, for word processing, and C-Table, for tables. The document's menu bar changes to reflect the object you're working on. If you have ever edited, say, a spreadsheet frame in ClarisWorks 4.0, you have some idea of the dynamic menus in the OpenDoc environment. WAV comes with OpenDoc itself; Cyberdog, for Internet connectivity; and a complementary assortment of other third-party OpenDoc software.

OpenDoc requires you to learn a whole new way of looking at the relationship between documents and applications. WAV, a new OpenDoc-based word processor, makes the effort worthwhile.

WAV offers a basic set of features, including extensive support for Macintosh Drag and Drop (even for URLs and pages or selected text from Cyberdog), dynamic text wrap (the text redraws as you move a graphic or other object), sections, columns (with automatic rules, if desired), and basic low-end editing/formatting capabilities. It also has some attractive built-in designer lines and frames (even drop shadows) for sprucing up objects on the page.

Besides Cyberdog, other included OpenDoc parts (some of which are simply demos) supply added capabilities. Among them are C-Table (tables), C-Graph (charts), and LEXI (spell checking). The FolderBay at the top of every document has tabs for installed OpenDoc parts and project folders that can include graphics, text, sounds, and video files you might want to have handy. You just drag an object or OpenDoc part onto the page to use it in the current document.

WAV does not support footnotes, endnotes, or style sheets. A Digital Harbor spokesperson said the company planned to incorporate these key features and WorldScript before the end of 1997 but stressed that, in keeping with the OpenDoc vision, it will not put every conceivable feature into its products. Other functionality will be achieved through other OpenDoc parts.

WAV can import only WordPerfect 3.5 and Microsoft Word 5.0 and 5.1 word-processing files. Although WAV costs only $69.95, by the time you add on and pay for other parts, which range from $10 to $30, the price can creep well over $100 — still a good deal, but the added cost should be kept in mind.

WAV won't replace Word or WordPerfect. Its feature set, even with other available OpenDoc parts added to the mix, is far too limited for professional writers, the corporate set, or university students. The lack of style sheets and footnotes/endnotes, in particular, currently rule it out for many users.

The Bottom Line

The collapse of Copland, the acquisition of NeXT, and uncertainty over Apple's plans for merging NeXT's technology with the aging Mac OS all cast some doubt over OpenDoc. But if you want to explore what Apple still claims will be part of the next-generation Mac desktop, there is no better way than through WAV. Check it out yourself: A demo is available at Digital Harbor's Web site. / Gregory Wasson

WAV 1.0.1, $69.95 (estimated street). **Company:** Digital Harbor, Orem, UT; 800-759-2204 or 801-224-5184; http://www.dharbor.com/. **Reader Service:** Circle #416.

La Cie FM Radio Module

3

Turn your $2,500 Mac into a $20 radio with this $50 gadget.

YOUR MAC CAN TUNE IN a TV station, connect to a fax machine or telephone, and tap into the Internet, but until now — with the arrival of the FM Radio Module, from La Cie — there has been no way for it to ride the FM airwaves.

The FM Radio Module is a plastic box, about the size of a deck of cards, equipped with a thin, 5-foot antenna wire. Its companion application, FM Tuner, lets you scan stations, store up to 50 station presets, and adjust the radio's sound settings.

Cables on the module plug into your desktop Mac's microphone jack (the FM Radio Module doesn't work with PowerBooks) and into the ADB port. In a poor design move, La Cie provides no passthrough port for your Mac microphone. Whether radio sound is routed through a built-in headphone jack, your Mac's internal speaker, or external speakers, FM stereo signals come in loud and clear.

We had hoped the FM Tuner software would do nifty things that no standard radios can, but we were disappointed. It's little more than a digital version of the same old analog controls: Sliders let you select station frequency (numbers appear in an "LED" display) and adjust volume and tone. The few items you won't find in a Radio Shack special include those 50 presets (which are hard to organize after they're entered via a spreadsheetlike interface), a pop-up menu that lists ten entries in your presets list, a Control Strip module that lets you adjust volume and switch among those first ten presets, and a mute button.

The Bottom Line

The $50 FM Radio Module gives you little benefit over what you'd get from a less expensive transistor radio and makes you sacrifice the use of your Mac's microphone jack to boot. Until its software gains more features, we'll stick with the old standby. / Jim Shatz-Akin

La Cie FM Radio Module, $50 (estimated street). **Company:** La Cie, Beaverton, OR; 800-999-1179 or 503-520-0845; http://www.lacie.com/. **Reader Service:** Circle #415.

Image Alchemy

★★★★

Multitalented graphics-file-format converter adds color, size controls.

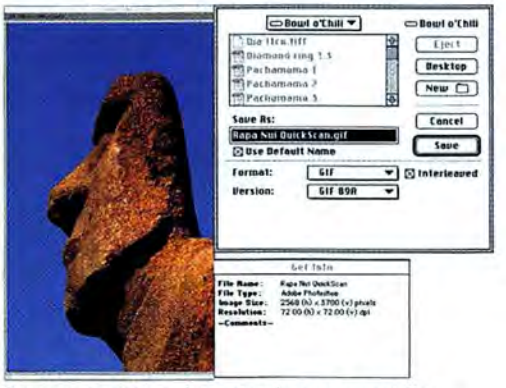
IMAGE ALCHEMY'S CREATORS strive to have their file-format converter read and write every type of image file in the world. They're off to a good start, with support for some 65 formats, including such esoterica as ADEX, CALS, QDV, and VIF as well as the more common TIFF, EPS, JPEG, and GIF. If you need to send images to or receive them from a Windows, DOS, or UNIX application, you'll find that Image Alchemy almost certainly supports a format that will allow you to do so.

Image Alchemy doesn't stop at format conversion. It lets you resize images; adjust brightness, contrast, and gamma; apply convolutions such as sharpen or blur; change the number of colors in an image; convert between RGB and CMYK; and if the output file format supports it, apply compression.

Image Alchemy has sophisticated controls for converting true-color images to paletted ones. It has a variety of dithering techniques and several color-reduction algorithms. But it can't calculate a single optimum palette for a series of images, as does its strong competitor Equilibrium Technologies' DeBabelizer.

Some controls are extremely powerful but difficult to adjust. The program ships with three convolution kernels — Sharpen, Blur, and Edges — which are roughly equivalent to Photoshop's Unsharp Mask, Gaussian Blur, and Find Edges filters. But the Image Alchemy kernels are simply text-format tables, which you can modify. Similarly, the RGB-to-CMYK conversion uses undercolor-removal tables that provide both RGB-to-CMY correction and black-generation tables. You can create your own tables, but the learning curve for doing so is quite steep.

For repetitive tasks, you can write AppleScript scripts or record scripts from within Image Alchemy. For speedy operation, Image Alchemy allows you to open and convert images without viewing them. You can open multiple images simultaneously this way and designate a default script to be applied to each image. Taken together, these features make it possible to convert a folder full of images very quickly with a minimum of intervention.

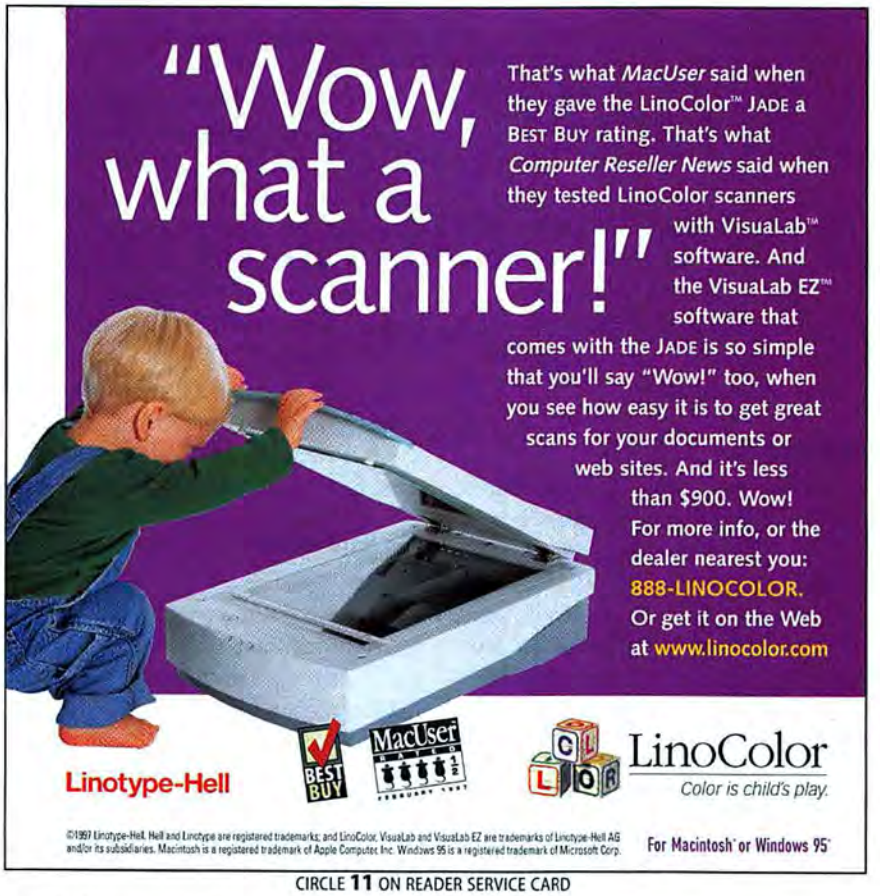


You can convert an image's color space as well as its format quickly and automatically with Handmade Software's Image Alchemy.

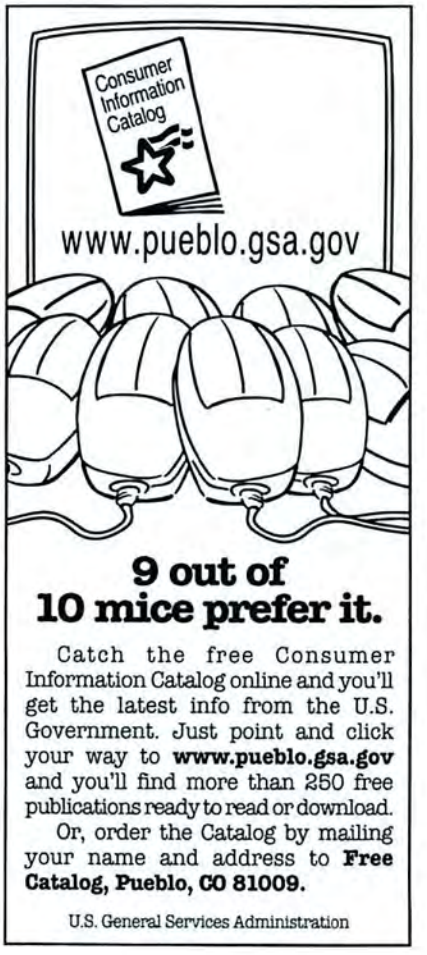
The Bottom Line

Image Alchemy can't replace a full-blown image editor, but when you need to make minor contrast and sharpness adjustments in addition to converting files, it will do everything you need and do it quickly. / Bruce Fraser

Image Alchemy, $295 (list). **Company:** Handmade Software, Fremont, CA; 800-252-0101 or 510-252-0101; http://www.handmadesw.com/. **Reader Service:** Circle #419.



CIRCLE 11 ON READER SERVICE CARD



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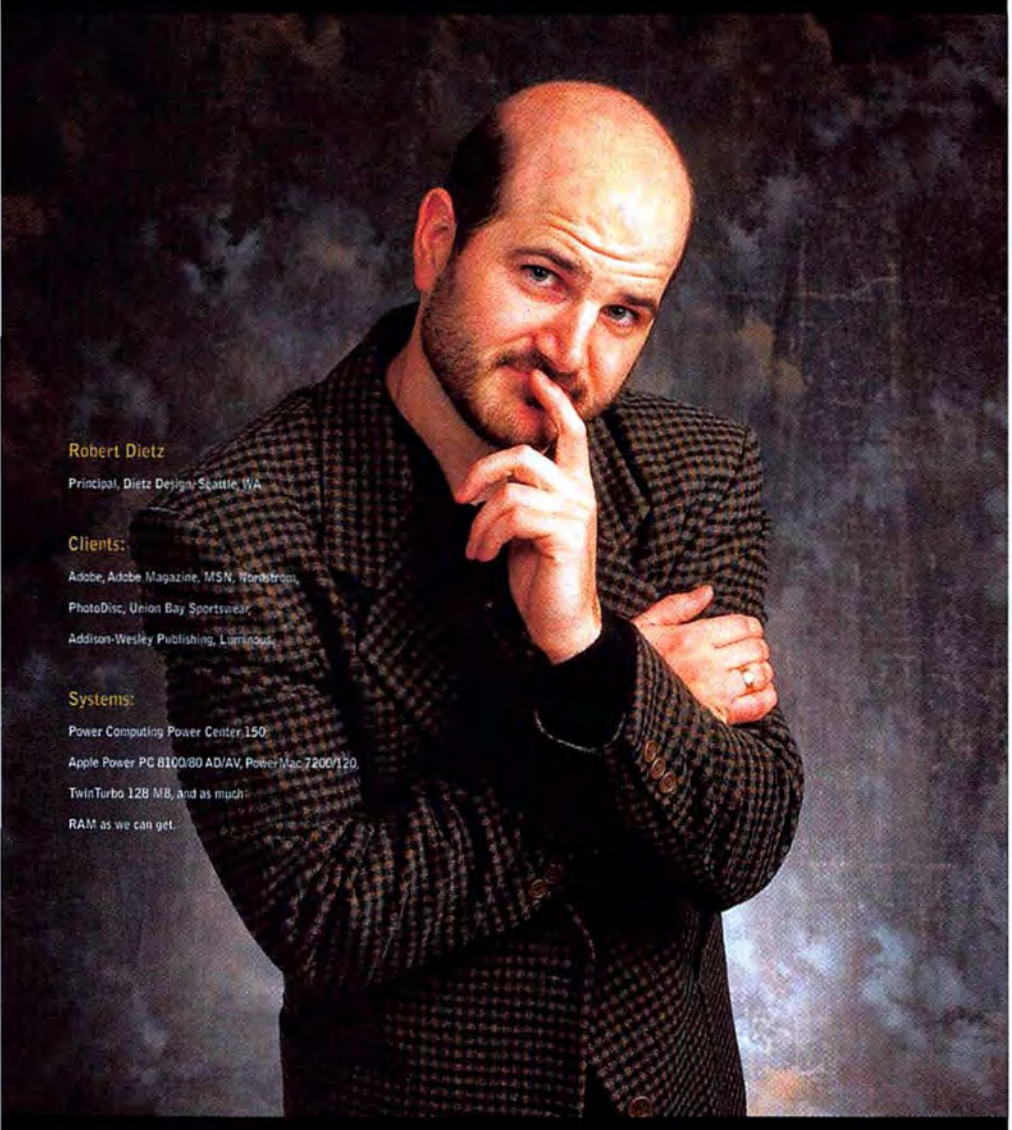

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Audiotracer

4 4 4 4

Elegant software makes it easy to create custom audio CDs.

REMEMBER THOSE AFTERNOONS you spent sitting on the floor in front of your stereo, buried in piles of CDs, as you labored to create custom audio compilations? If carpet lint in your tape deck isn't your thing, you'll be pleased that Microtest's Audiotracer software has moved the process from your living-room floor to your 68040 or PowerPC system.

Audiotracer lets you use your Mac, a CD-ROM drive, and a CD-R drive to make your own compilation audio CDs — a far more durable repository for your creative arrangements than a flimsy cassette doomed to inferior sound and a limited life span.

Making compilations is traditionally cumbersome. You need to arrange, time, and juggle CD tracks so everything fits; assemble and queue the CDs; set input levels; double-check everything (twice); and then hit Record and Pause for the next two hours. After all that, you often still end up with a pale imitation of the original CD's sound quality.

Audiotracer replies to these drawbacks with a simple drag-and-drop process and produces a durable recording to boot. The program's simple interface provides a straightforward creation environment. Drop a blank CD into your CD-R drive, pop an audio CD into your CD-ROM drive, and simply drag and drop numbered tracks from one window to the other. (You need to name the tracks, since they are identified only by number in the audio-CD format.)

Audiotracer adds up track times as tracks accumulate, keeping tabs on the total time. Remove the first audio CD and put in another, and Audiotracer retains track information from the first. Add more tracks from more CDs, and change the order of the tracks on the compilation at any time with simple drag-and-drop. This process creates a cataloged queue, which serves as the blueprint for your ultimate CD-to-be.

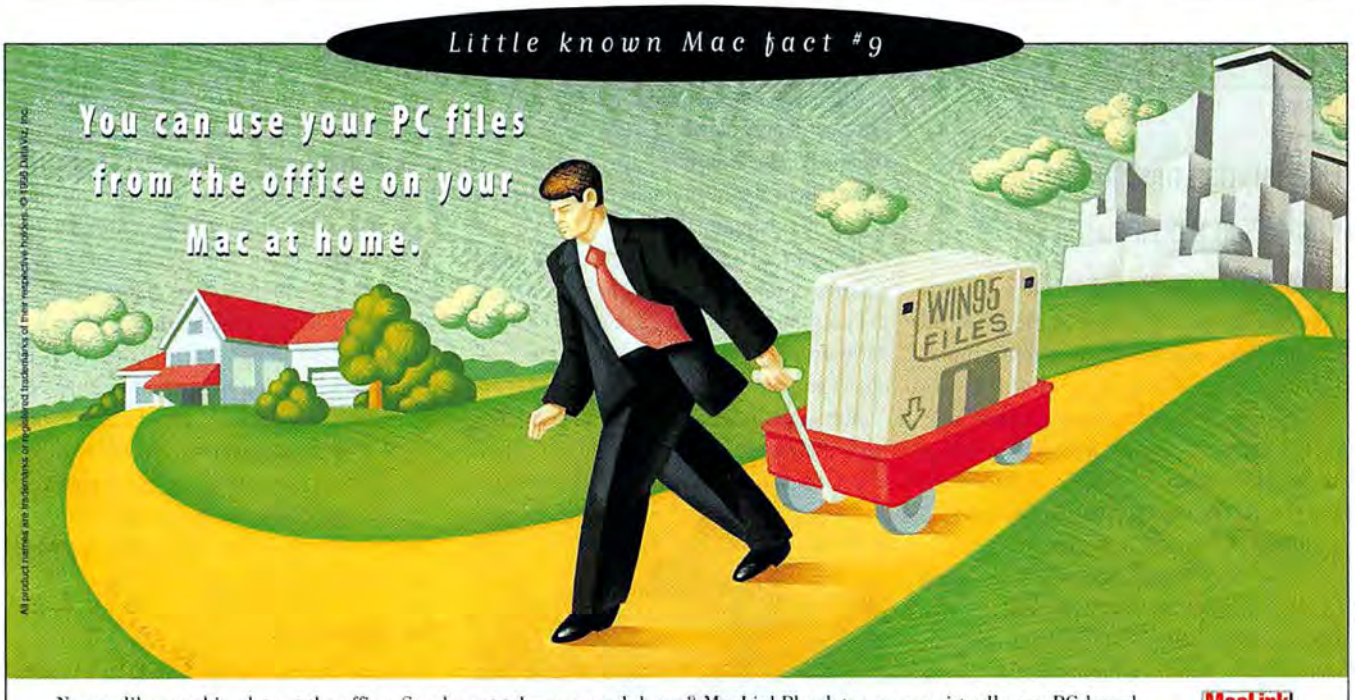
Set the session specifications — read/write speed and cache size — in another window. You can even automate the recording process, including confirm, test, finalize, and eject. When you start the session, Audiotracer asks for the original CDs one by one, based on your preprogramming. Copy quality mirrors that of the original CD, since Audiotracer duplicates tracks bit for bit.

All this takes a serious amount of hard-disk space, however. The fastest way to complete your recording session is to let Audiotracer cache the data to your hard disk before copying it onto the blank CD. Microtest recommends allowing 10 MB of disk space per minute, or 740 MB for a full 74-minute audio CD. If you record with a smaller hard-disk cache, recording speed is sacrificed. Even with an ample disk cache, recording a complete compact disc takes several hours.

The Bottom Line

As simple as Audiotracer is to use, making your own CDs is still expensive and time-consuming. A CD-R drive will run you $800 and up, and you'll probably want to add a high-capacity hard drive ($250 to $300 for a 1-GB drive) or devote a large portion of your existing disk to recording. Thankfully, blank CDs cost only about $9 apiece. / Shelly Brisbin

Audiotracer 1.0, $99 (list). **Company:** Microtest, Phoenix, AZ; 800-347-2664 or 602-952-6400; http://www.microtest.com/. **Reader Service:** Circle #420.



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Live Picture XT

4½

Take a closer look at images in QuarkXPress with hi-res zoom.

PHOTO EDITORS, COMPOSITORS, and other graphic designers can now crop, magnify, and manipulate images quickly and precisely in QuarkXPress, thanks to Live Picture XT (LP XT). This XTension lets you magnify images up to 1,200 percent, without losing visual detail or requiring incredible amounts of RAM.

To view images in this way, you first convert them to Live Picture's IVUE format in LP XT. (You can direct LP XT to create IVUE-formatted copies of images automatically whenever you place them in QuarkXPress.) You can also convert already placed images, but conversion takes about 30 seconds for a moderate-sized image, so you will probably want to take advantage of LP XT's batch-conversion feature.

LP XT integrates nicely with QuarkXPress, letting you use that program's own zoom tool to achieve up to 1,200-percent magnification. But LP XT also adds additional functionality.

You can create CMYK separations of the IVUE images and use the Unsharp Mask filter by issuing LP XT's Separation Control command. In its Normal mode, this command lets you select a separation table and choose from preset Unsharp Mask settings. Advanced mode gives parameters for color separation and sliders for customizing USM settings. Both modes display "before" and "after" thumbnails for your changes.

LP XT includes a default RGB-to-CMYK separation table, but you can create or import your own by using the LP Table Maker application (included).

Less experienced designers may have difficulty making use of LP Table Maker's undocumented powerful features, since the LP XT documentation is clear but not extensive.

Images in the IVUE format have slightly larger file sizes than their originals, so make sure you have enough disk space for them or LP XT will crash your system. Live Picture plans to fix this problem with a free update.

Image quality is preserved at 900-percent magnification in Live Picture XT's IVUE format (right), unlike in other formats, such as PICT (left).

The Bottom Line

Live Picture XT's ability to view images in QuarkXPress at high magnifications without image degradation is a real benefit, and it makes masking and cropping much easier. The Bézier drawing tools in the upcoming QuarkXPress 4.0 should make Live Picture XT even more useful, since the close-in, high-resolution display will allow you to create precise silhouettes directly from within QuarkXPress. / Bob Schaffel

Live Picture XT 1.0, $149 (estimated street). **Company:** Live Picture, Scotts Valley, CA; 800-724-7900 or 408-438-9610; http://www.livepicture.com/. **Reader Service:** Circle #421.

Chromatica

4

One hit, one miss in pair of Photoshop plug-ins.

CHROMATICA CONTAINS A PAIR of mismatched Photoshop plug-ins: the powerful ChromaColor and the lightweight ChromaPalette. ChromaColor is an alternative to Photoshop's Color Range and Replace Color tools. It lets you change an object's color within an RGB image quickly and easily and blend the recolored image to the original background with the nifty Edge Wizard feature.

The ChromaColor plug-in has two panes, ChromaMask and ChromaColor, each accessible via a tabbed palette. The first step in changing an object's color is to drag ChromaMask's masking tool over the object you want to recolor; the mask is calculated automatically. The Contiguous Selection option masks only those pixels adjacent to the ones you select; with the option unchecked, all the pixels in the selected color range are masked. You are able to fine-tune the mask by Shift-clicking to add pixels or by using the eraser tool to remove pixels.

After selecting the object, you switch to the ChromaColor pane, which lets you select a new color to replace the original. The program does an excellent job of maintaining texture and tone while changing the hue.

EdgeWizard is the feature that really differentiates ChromaColor from the built-in tools in Photoshop. It calculates smoothly blended, natural-looking edges between the recolored object and the background.

Although ChromaColor tackles recoloring tasks that would be extremely difficult, if not impossible, with Photoshop's built-in tools, it can't work miracles. It did a good job of turning a blue sweater green, for example, but when we tried to turn the sweater yellow — an extreme color change — we ended up with a fairly unnatural-looking result. We hasten to add that this has been true with any tool we've tried. Making extreme color changes look natural is challenging, and ChromaColor goes further than most tools before it fails.

The ChromaColor Photoshop plug-in, part of Chroma Graphics' Chromatica package, can easily recolor any object in an image.

The uses for ChromaPalette are less obvious. It allows you to replace all the colors in an image with those from another image or from a predefined palette, either created with the plug-in or selected from one of the thousand palettes shipped as part of the package. The results tend to be lurid and weird, although we were able to create some interesting false-duotone effects.

The Bottom Line

Although its ChromaPalette plug-in has only limited usefulness, the ChromaMask/ChromaColor color-adjustment combination alone is worth Chromatica's price. / Bruce Fraser

Chromatica, $149.95 (direct). **Company:** Chroma Graphics, Burlingame, CA; 888-824-7662 or 415-375-1100; http://www.chromagraphics.com/. **Reader Service:** Circle #422.

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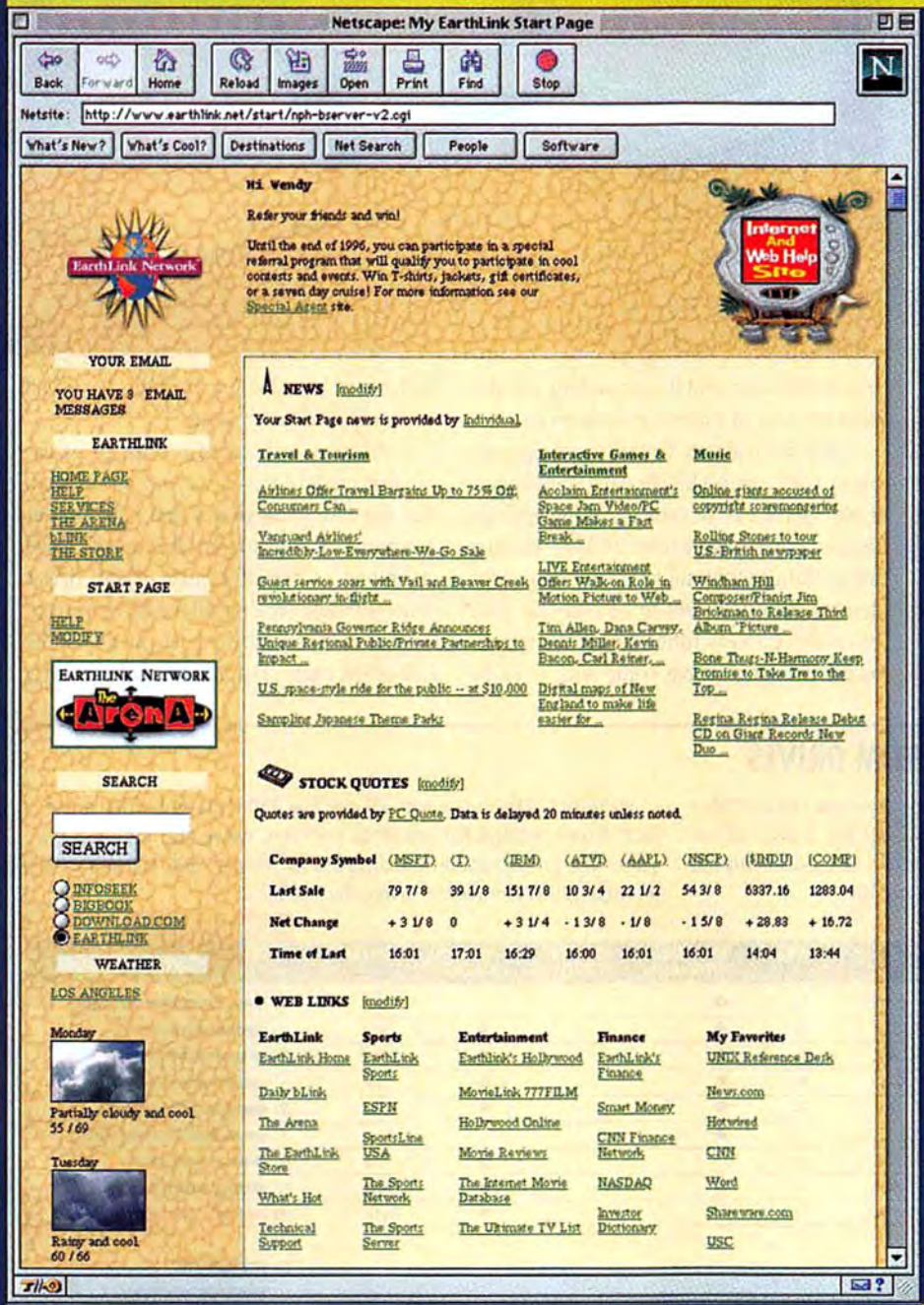

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CIRCLE **90** ON READER SERVICE CARD

CD-ROM Drives

IN JUST A YEAR, we've seen the speeds of CD-ROM drives increase dramatically. Just when 4x CD-ROM drives were settling in as the norm, 8x and 12x drives, promising blazing speeds, started to appear. With every software package now being released on CD-ROM, should you be content with your current drive or spend the money on a faster one? How much of an increase in speed will you really see if you use an 8x or 12x CD-ROM drive rather than a 4x one?

For this month's report, MacUser Labs tested six 8x and three 12x drives in order to help answer these questions — as well as a few others. We found that although the faster drives do provide a speed boost, it's not as much as the names imply.

PHOTOGRAPHY / ADRIAN ORDENANA

The New Math

The very first generation of CD-ROM drives transferred data at a rate of 150K per second. Ensuing generations increased in multiples of the same rate — a 2x drive delivers data at 300K per second, an 8x drive at a rate of 1,200K per second (or 1.2 MB per second), and a 12x drive at a rate of up to 1.8 MB per second. Keep in mind that these are theoretical, best-case, data-transfer rates. Access time, buffer size, and driver caching are also determinants of a drive's overall speed.

You'll immediately benefit from upgrading to a drive with a higher data-transfer rate if you spend a lot of time installing applications or moving large (over 10 MB) files. But when dealing with smaller files or doing random reads, you'll want to be sure the drive has a short access time as well. We recommend that your drive come with a cache buffer of at least 256K, to help the drive read and temporarily store data.

A drive's overall speed is affected by the caching method it uses, as you can see from our test results for drives that have similar mechanisms. The differences in speed can be attributed to the efficiency of the driver software's data caching. All the drivers except for that of the La Cie drive let you adjust the size of the cache, but La Cie's driver is very

FEATURES AND SPEED OF CD-ROM DRIVES

TO GAUGE THE SPEED of each CD-ROM drive, we ran our MacBench 4.0 CD-ROM test. A higher score signifies a faster drive. MacBench 4.0 scores are relative to that of a 4x CD-ROM drive in a Power Macintosh 6100/60, which has a score of 100.

We tested all the drives with a Power Mac 7600/132 and with their default driver settings. For reference purposes, we've also included the scores of a 4x internal CD-ROM drive in a Power Mac 7500/100 and an 8x internal CD-ROM drive in a Power Mac 7600/132.

RATING	PRODUCT	LIST PRICE	MECHANISM	SPEED	TRAY LOADING MECHANISM	AUXILIARY AC OUTLETS	CONTROLS ON CASE	WARRANTY	MACBENCH 4.0 SCORES CD-ROM
♦♦♦♦	✓ **La Cie** 12x CD-ROM	$199	Toshiba XM-5701TA	12x	●			1 year	370
♦♦♦♦	**MicroNet** Advantage 650	$199	Philips PCA80SC	8x	●		●	1 year	289
♦♦♦½	**APS** CD8	$179	Philips PCA80SC	8x	●		●	1 year	242
♦♦♦½	**Mirror** 8x CD-ROM	$209	Philips PCA80SC	8x	●		●	1 year	241
♦♦♦½	**NEC** MultiSpin 8Xe	$449	NEC CDR-462	8x	●		●	1 year	322
♦♦♦	**DynaTek** CDS662T	$329	Toshiba XM-5701TA	12x	●	●		1 year	357
♦♦♦	**Plextor** 8PleX	$449	Plextor PX-8XCS	8x			●	1 year	281
♦♦½	**Philips** PCA80SC	$299	Philips PCA80SC	8x	●		●	1 year	243
♦♦½	**Plextor** 12PleX	$509	Plextor PX-12XCS	12x			●	1 year	381
	REFERENCE SYSTEMS								
	Internal 4x drive in Power Mac 7500/100								184
	Internal 8x drive in Power Mac 7600/132								317

✓ MacUser BEST BUY ■ Best performer in test. LISTING IS ALPHABETICAL WITHIN GROUPS OF EQUAL MOUSE RATINGS.

SCORE BETTER

efficient at caching. FWB Software's CD-ROM ToolKit, which ships with the DynaTek, Mirror, and Plextor drives, offers a variety of caching options. MicroNet uses proprietary software, CD Utility, and NEC uses an OEM version of DriveCD, from Casa Blanca Works. The drives from APS and Philips come with driver software from CharisMac. During our testing, we found an incompatibility between the CharisMac software and MacBench 4.0, which gave us erroneous results. To get numbers for these two drives, we used FWB's CD-ROM ToolKit (which is available as a separate product). CharisMac is working on the incompatibility and should have it fixed by the time you read this.

How Fast Is Fast?

We used MacBench 4.0's CD-ROM test to evaluate the two most important aspects of each drive's performance: data-transfer rate and access time. We then arrived at an overall comparative measure of the drives' performance. For reference, we also ran the CD-ROM test on the 4x internal CD-ROM drive in a Power Mac 7500/100 and the 8x internal CD-ROM drive in a Power Mac 7600/132.

The fastest drive was the Plextor 12PleX, which has a 12x mechanism and a generous 512K buffer. The DynaTek and La Cie drives, which each have a Toshiba mechanism, gave slightly differing results. The La Cie driver, which lacks caching control, did a surprisingly efficient job of controlling the drive, which finished the tests slightly ahead of the DynaTek drive.

In looking at the average speed difference between the 12x and 8x drives, we found that the 12x drives were only 37 percent faster — not as much as we expected. If you already own an 8x drive, upgrading to a 12x drive may not be worth it.

The NEC MultiSpin 8Xe finished ahead of the pack of 8x drives, although the internal 8x drive in the Power Mac 7600/132 was right on its heels (keep in mind that the Mac's internal SCSI bus transfers data at 1.0 MB per second compared to the external SCSI bus' rate of .5 MB per second).

Comparing our results for the 8x drives, the MicroNet and Plextor drives finished in the middle of the pack, about 10 percent slower than the NEC drive. The Mirror drive, which is based on a Philips PCA80SC mechanism, offered disappointing speed; the drive was about 15 percent slower than the average and only 30 percent faster than the Power Mac 7500/100's internal 4x drive. We found that the 8x drives were about 50 percent faster on average than the Apple internal 4x drive. And if you look at the numbers closely, you can see that the 12x drives really offer double the speed of 4x drives, or what you might expect from an 8x drive.

Case Design

Although speed is key, you'll be dealing with your drive on a daily basis, so case design is also important. All the drives we tested had a few basic features in common: RCA jacks, a headphone jack, and volume control. The Plextor drives also come with audio cables for their RCA inputs.

Being able to control audio capabilities directly from the drive's front panel is an added benefit. Mirror, NEC, and Plextor all provide some control on the front of the case; DynaTek's and La Cie's cases have only a simple volume control and an eject button. All the drives come with some sort of software for playing audio CDs.

The presence of a built-in CD-ROM tray seems to be common in these drives, except for those from Plextor, which require the use of a caddie (the 12x drive is also available with a built-in tray, but the 8x drive is not). Some people prefer to keep their discs in caddies for protection from scratches and dings, but others consider having a built-in tray a luxury that eliminates the expense of buying extra caddies.

The Bottom Line

The newest generations of drives offer some distinct speed gains, but whether or not you'll be able to take advantage of this new speed depends on the tasks you'll be using the drive for.

If you're still in the world of 2x, getting an 8x drive would be a vast improvement. If you have a 4x drive, you're better off upgrading to a 12x drive. But remember: Most CD-ROMs developed today are optimized to run at 4x, so casual users may not be able to take advantage of the speed increase 12x drives offer. For users who install a lot of applications or regularly manipulate large files, an 8x or 12x drive could speed things up.

If you're looking for either a new CD-ROM drive or an upgrade for your 4x drive, take a look at the fast $199 La Cie 12x CD-ROM drive. But remember that the La Cie drive doesn't have control caching and it has just a bare-bones case design.

Perhaps the biggest factor that may influence your purchasing decision is the introduction of DVD (see "Apple, Power to Take DVD Lead," March '97, page 30). You may want to wait and see how DVD pans out before you upgrade. / *MARTIN WONG*

smart shopper

5 questions to ask when you're buying a CD-ROM drive:

1. Can you configure the driver-software settings?
2. What is the cache-buffer-size setting, and is it adjustable?
3. What type of SCSI connection does the drive have, and is an appropriate cable included?
4. What types of hardware controls are offered on the drive's front panel?
5. Does the drive have RCA jacks?

DIRECTORY

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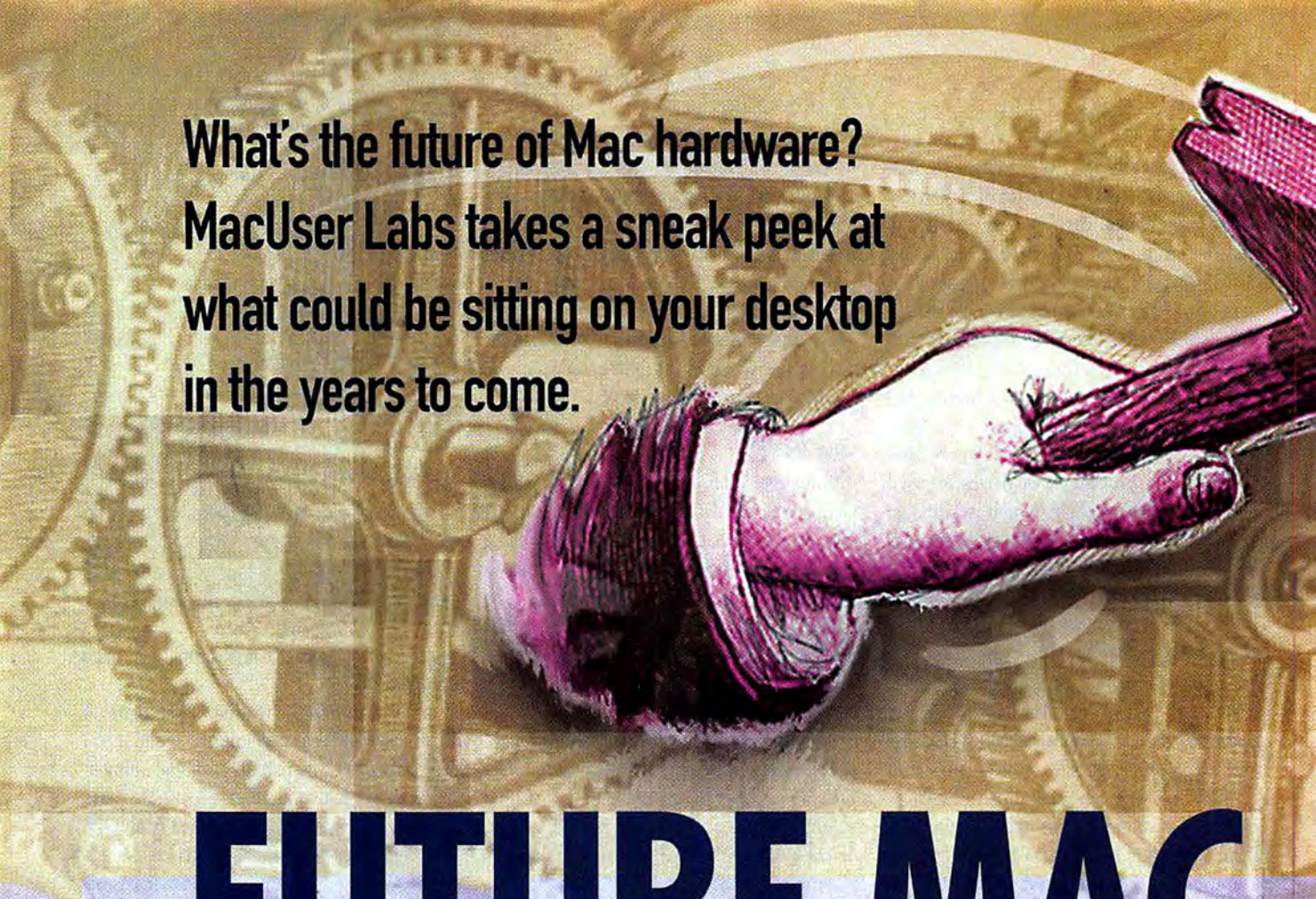
What's the future of Mac hardware? MacUser Labs takes a sneak peek at what could be sitting on your desktop in the years to come.



FUTURE MAC

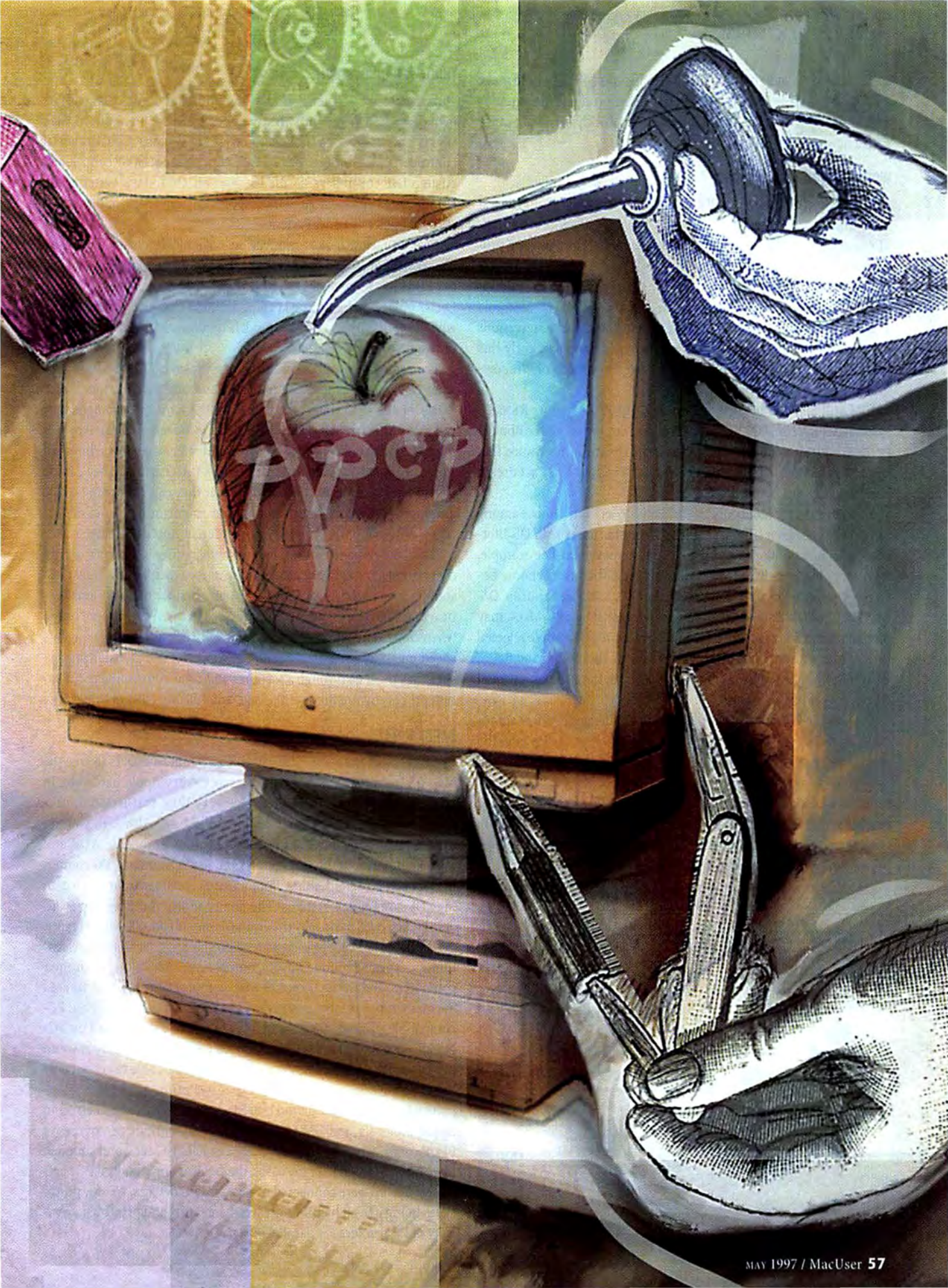
MacUser LABS

APPLE'S ACQUISITION OF NEXT HAS MADE A LOT OF NOISE LATELY, but an earlier cooperative effort will soon have its effect on Macintosh hardware. Three years ago, Apple, IBM, and Motorola got together to create an open computer-hardware platform based on PowerPC processors. This new platform would make it easier for companies other than Apple to create Mac OS-compatible systems. The trio dubbed this new hardware design CHRP (pronounced "chirp"), for Common Hardware Reference Platform. However, after lawyers and marketers got through talking, the official name was changed to the more cumbersome PPCP, which stands for PowerPC Platform.

PPCP, the companies claimed, would offer Mac-clone vendors two major advantages. PPCP systems would run not only the Mac OS but also Windows NT, AIX (IBM's version of UNIX), and a handful of other operating

By Henry Bortman

ILLUSTRATION / ANDREW FAULKNER


PPCP

systems. And because it was an open specification, PPCP would make it easier for clone makers to differentiate their products from Apple's and would enable Apple and its licensees to quickly bring out innovative new models.

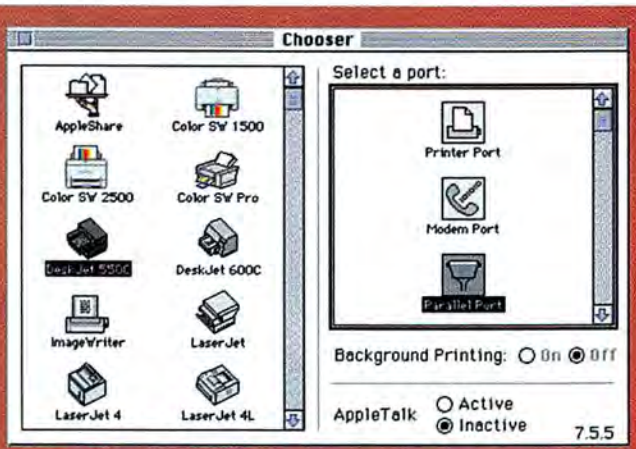
WON'T DO WINDOWS ANYMORE

Of course, since the birth of PPCP, times have changed — PPCP systems won't do Windows in the future. Despite costly efforts by IBM, Microsoft, and Motorola to modify Windows NT 4.0 for PowerPC processors (Motorola has been shipping Windows NT-compatible PowerPC-based computers for years), neither customers nor developers have shown much interest. Late last year, IBM and Motorola announced that their PowerPC-based systems would not run versions of Windows NT after version 4.0. Microsoft followed suit early this year by abandoning plans to develop a PowerPC version of Windows NT 5.0.

IBM still plans to incorporate elements of PPCP into its RS-6000 systems, which run AIX. But AIX never got Mac users excited about a multi-OS PPCP system; rather, it was the dream of hardware that would be able to run both the Mac OS and Windows NT. That dream has died.

Nevertheless, the ability of PPCP systems to let users choose among multiple OSs at boot time will still provide Mac users with OS alternatives — just not the alternatives initially envisioned. For example, it's reasonable to assume that PPCP systems will let users choose between the Mac OS and Rhapsody, Apple's next-generation OS. NeXTstep, which Apple is planning to port for PowerPC Macs, may offer another choice. But there is one more OS, the one Apple rejected for the Mac's future, that will definitely be an alternative: the BeOS. Be is fully committed to having its operating system run as an equal OS citizen on PPCP systems.

Despite the Windows NT setback, plans to deliver PPCP Macs remain on schedule — well, OK, not *exactly* on schedule. But even the most pessimistic prognosticators now agree that PPCP systems will ship in the second half of this year. Even without Windows NT, PPCP remains a compelling architecture for Mac-clone vendors and for Apple itself. If PPCP fulfills its promise, you can expect to see more Mac-clone vendors, faster innovation, better performance, and lower prices. And who could complain about that?



MANY PPCP SYSTEMS WILL CONTAIN a parallel port, standard on PCs but new to the Mac. This will enable Mac users to use PC printers, which will appear in the Chooser beside traditional Mac-compatible printers.

THROTTLED INNOVATION

Today, there are a handful of Mac logic-board designs, each with its own custom ROM, all initially developed by Apple. In addition, Mac OS systems contain several customized Apple chips: GeoPort serial controllers, Mac-proprietary sound chips, custom SCSI controllers, custom IDE controllers — the list goes on. On today's systems, the relationships among Mac ROMs, Apple's custom chips, and the Mac OS are hopelessly codependent.

That situation makes innovation difficult. If system hardware changes, the custom chips have to change; if the custom chips change, the ROM has to change; if the ROM changes, the OS has to change. Even Apple has a hard time keeping all these changes straight. That's why the company's basic Mac models tend to stick around for a year or two before they get replaced.

The problem is even worse for clone makers. They're stuck with what Apple decides to do or not do. Clone makers can't touch Mac ROMs or the Mac OS — consequently, the hardware changes they can make are extremely limited. Sure, clone makers can beat Apple to the punch with faster processors. They can offer larger L2 caches than Apple or higher-capacity disk drives and RAID arrays. They can be first to offer such options as Zip drives, or they can choose to bundle graphics accelerators. They can design their enclosures for easier access to internal parts. And they can undercut Apple's pricing.

But clone makers cannot, for example, reduce a system's overall cost by replacing Apple's custom IDE controller with a lower-cost PC-standard part. Or deliver a new high-performance memory architecture that boosts the speed of high-end systems. And in some cases, when clone vendors do decide to innovate, such as by increasing bus speed on an existing Mac design to enable the use of faster processors, they must go through a tortuous and time-consuming certification process before they get the nod from the big guns in Cupertino.

BARGAIN MACS

PPCP changes the rules. The whole idea behind PPCP is to free the Mac OS from its incestuous ties to proprietary Apple hardware. In fact, the PPCP specification contains very little that is Macintosh-specific (see the "PPCP: Under the Hood" figure). Although you can expect most Macs for the foreseeable future to include ADB and LocalTalk ports, PPCP also enables the use of standard PC components, such as sound chips, floppy drives, keyboards, and mice, in Mac OS-compatible systems. The ability to use these readily available low-cost PC parts may finally make the sub-$1,000 Mac a reality.

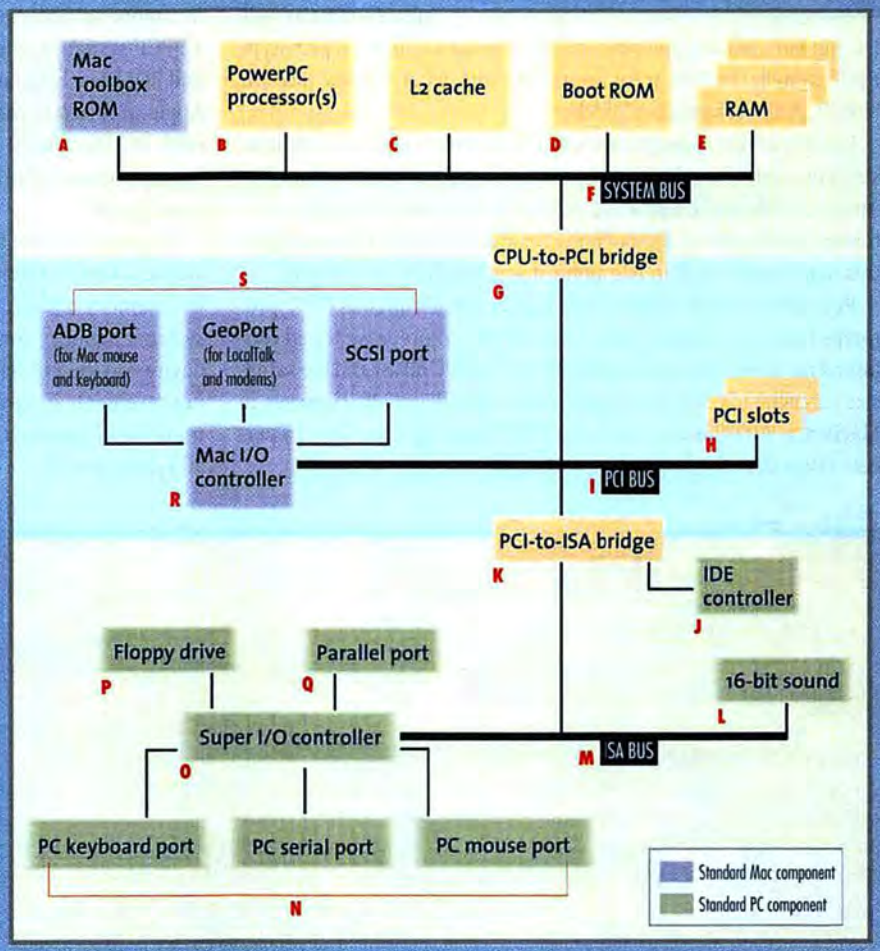
The potential benefit increases when you consider that many customers, especially home buyers, purchase printers along with their computers. Today, the choice of Mac-compatible printers is limited — many more printer models are available for the PC market. PC-compatible printers have parallel ports, which are standard on PCs but are absent from today's Macs. But PPCP Macs, especially low-end models, will have parallel ports. Customers will be able to get not only less expensive Macs but also less expensive printers.

As part of our investigation into PPCP, we met with engineers from Apple, Motorola, and UMAX, who showed us working prototypes of PPCP computers. They looked like Macs, felt like Macs, and sounded like Macs, although in many cases, they were using standard PC parts internally and were connected to standard PC devices. We saw prototypes being driven by IBM mice and keyboards and printing to a variety of PC printers via parallel ports.

PPCP: Under the Hood

THE POWERPC PLATFORM GIVES MAC-CLONE MAKERS new freedom from having to rely on Apple's Macintosh logic-board designs. PPCP enables licensees to engineer new ways of handling memory, I/O, and other system functions as well as to bring innovative products to market faster and reduce the overall cost of Mac OS systems. In addition, Mac OS ROM independence provides even more freedom to clone makers.

The diagram shown here is a simplified composite of a PPCP system's core functions and is based on the PowerPC Platform specification and on reference PPCP logic-board designs from IBM and Motorola. Not all the elements shown will be present in every PPCP system; some systems will incorporate elements not shown, and some will implement components differently from the way this diagram indicates.



A. The Mac Toolbox ROM has been an essential element of every Mac since the first 128K Mac. In PPCP systems, Toolbox instructions may be implemented in software.

B. Every PPCP system will contain one or more PowerPC processors.

C. An L2 cache, which improves system speed, will be an option in PPCP systems.

D. New in PPCP systems, the Boot ROM is responsible for the early stages of system startup, before the operating system has been loaded into memory. On systems with more than one OS installed, the Boot ROM will let users choose which operating system to load. When a PPCP system starts up, the Boot ROM also "examines" the system's hardware configuration and passes that information to the chosen OS.

E. RAM, or system memory, will be upgradable in PPCP systems, as it is in today's Macs.

F. The system bus connects elements such as the cache and RAM directly to the processor. In PPCP systems, bus speeds will start at 66 MHz.

G. The CPU-to-PCI (a.k.a. north) bridge is a chip or a set of chips that controls the flow of data between the system bus and the PCI bus. Motorola and VLSI are two companies that make this chip set; some system vendors may opt to design their own north bridge.

H. Most PPCP systems will contain one or more PCI expansion slots.

I. The PCI bus is the primary expansion bus for PPCP systems.

J. The optional IDE controller will allow system designers to include IDE hard-disk and CD-ROM drives, which cost less than their SCSI counterparts. As with today's Mac models, expect to see IDE drives in low-end systems.

K. The PCI-to-ISA (a.k.a. south) bridge is a required chip set for PPCP-compliant systems. It connects the primary PCI bus to the ISA bus. Elements connected to the south bridge are standard PC parts that are widely available and typically cost less than their Mac analogs.

L. Many PPCP systems will implement 16-bit sound by using standard PC Sound Blaster chips instead of proprietary Mac sound chips.

M. The ISA bus, a standard PC expansion bus, enables PPCP systems to incorporate a wide variety of low-cost PC parts.

N. Now that future versions of Windows NT will not be supported for PPCP systems, Mac-clone makers may omit this section, which supports PC keyboard, serial, and mouse ports.

O. National Semiconductor's Super I/O chip is a low-cost peripheral controller found in most PC systems today and is a likely candidate for inclusion in PPCP systems.

P. The use of PC-style floppy drives will enable PPCP-system vendors to reduce overall system cost.

Q. Expect to see standard PC parallel ports on many PPCP systems, especially low-end machines.

R. The Mac I/O controller, a common chip in today's Macs, will provide support for common Mac ports in PPCP systems.

S. Until new I/O interfaces such as USB and FireWire become popular, PPCP systems will continue to include traditional Mac-style ADB, GeoPort, and SCSI ports.

BOOKMARK

RELATED INTERNET SITES

- **Apple Computer Mac OS Licensing**
  White papers, licensing information, spec sheets, and more.
- **Motorola's Power PC Home Page**
  For information on PowerPC processors and PPCP news.
- **The IBM PowerPC Microprocessor Web Site**
  New-product announcements, performance data, PPCP info, and more.

GO TO http://www.zdnet.com/macuser/0597.html#chrp

THE FAST LANE

The use of low-cost PC devices is not the only benefit that PPCP will bring to the Mac market. Expect to see some serious performance gains from these new systems as well. During our visit to Apple, we used MacBench 4.0 to test a prototype PPCP system, and we were impressed with what we saw (see the "PPCP: Peak Performance" sidebar).

It is important to emphasize that the unit we tested was a demonstration model, based on the Viper logic-board design developed by Apple and Motorola. Apple has no plan to ship such a system to customers. Furthermore, although the version of the Mac OS running on this machine was still in late alpha, it was not ROM-dependent.

Regardless, we saw significantly higher speed from this PPCP prototype than from shipping Macs. The Apple prototype we tested contained the same processor (a 200-MHz PowerPC 604e) and the same-size L2 cache (512K) as an Apple Power Mac 9500/200. However, in MacBench 4.0's Processor test, the PPCP prototype was over 25 percent faster than the Power Mac 9500/200.

Part of this speed gain was due to the faster system bus in the PPCP system. Whereas the bus speeds of today's Macs are typically in the range of 40 to 50 MHz, the PPCP spec calls for a system-bus speed of 66 MHz or higher. The system we tested had a 66-MHz system bus, which will be typical of the first shipping PPCP systems. But clone vendors are already talking about bus speeds of 75 MHz, 83 MHz, and possibly even 100 MHz in second- and third-generation PPCP systems.

The speed improvements are also a result of work Apple has done to remove bottlenecks from the Mac OS. To get the Mac OS to run on a PPCP system, Apple had to pore through huge sections of the OS and ROM, tracking down and removing any and all dependencies on Apple-proprietary chips. In the process, Apple engineers also uncovered and eliminated numerous performance bottlenecks. As fine-tuning proceeds, PPCP systems should show even more-impressive speed gains.

Clone vendors too are looking for ways to boost the speed of PPCP systems. One of the more interesting approaches is by redesigning the memory architecture. There is a complex interaction among a system's memory controller, processor, L2 cache, system RAM, and devices on the PCI bus. Mac OS licensees are hard at work designing improvements in memory architecture that will allow more data to move simultaneously in and out of RAM, thereby increasing the overall system speed.

PPCP: Peak Performance

AS PART OF OUR INVESTIGATION into the state of PPCP, we visited Apple to test a prototype PPCP system. The unit we tested was based on the Viper logic board, developed jointly by Apple and Motorola. Apple originally planned that its first shipping PPCP system would be based on this logic-board design but has since changed course. Apple continues to use a Viper system as the hardware on which it is doing the work of modifying the Mac OS to support PPCP, however.

The OS effort has turned out to be more difficult than originally anticipated. Many clone vendors point to Apple's delays in delivering the Mac OS for PPCP — actually, a PPCP system enabler for Mac OS 7.6 — as the primary reason why they haven't yet been able to bring PPCP systems to market. Apple's current target date for finishing the PPCP enabler is the end of May; it is on this basis that clone makers are targeting this summer or fall as the date when they will ship their first PPCP systems.

The software we tested was still in alpha. To date, Apple's system-software efforts have gone entirely into the daunting task of making sure the OS fully supports PPCP hardware. Apple's engineers have not yet focused their efforts on tuning the OS for optimum performance.

We compared the PPCP prototype with an Apple Power Mac 9500/200 and a Motorola StarMax 4000/200 MT. All three systems had a 200-MHz PowerPC 604e processor and a 512K L2 cache. The PPCP system outpaced both others, turning in the fastest MacBench 4.0 Processor score we've ever seen. This is due in large part to the PPCP system's 66-MHz system bus. The Power Mac 9500/200 has a 50-MHz bus and the StarMax 4000/200 MT a 40-MHz bus.

In MacBench 4.0's disk-subsystem tests, the PPCP prototype didn't show as much improvement. In fact, relative to the 9500, it didn't fare well at all. The 9500, however, contained a high-speed IBM drive, whereas the PPCP system had a slower Quantum Fireball. Apple said that it had not yet done any performance tuning on the disk-I/O portions of the PPCP enabler; final shipping systems should show improvement here.

Graphics speed should also improve in the released version of the Mac OS for PPCP systems. Even though the PPCP prototype had the same graphics-system implementation as the StarMax 4000/200 MT, it didn't keep pace with Motorola's shipping model. The 9500 was the fastest in our graphics tests because it contains a PCI graphics card that provides additional acceleration.

To see this kind of speed (the highest Processor score ever and quite respectable disk and graphics scores) on prototype PPCP hardware running alpha system software is impressive indeed and bodes well for the future. Fasten your seat belts.

MacUser LABS BETA

MACBENCH 4.0 SCORES

WE USED THE INDUSTRY-STANDARD benchmark software MacBench 4.0 to compare a PPCP hardware prototype running Mac OS 7.6 and an alpha version of the PPCP system enabler with an Apple Power Mac 9500/200 and a Motorola StarMax 4000/200 MT.

MacBench 4.0 scores are relative to those of a Power Mac 6100/60 with a 30-MHz memory bus, a 250-MB hard drive, 2 MB of built-in graphics RAM, and no L2 cache. This system is assigned a score of 100 for all tests.

WHO'S DOING WHAT

Although it's unlikely that any PPCP systems will ship before August or September, every system vendor in the Mac market is already making plans. After all, it's hard to argue with a new architecture that offers both lower cost and better performance. Here's a look at what the major Mac OS-system manufacturers are working on:

Apple. Curiously, after spearheading the whole move toward PPCP, Apple's current plan is to borrow some technology from PPCP designs but not to deliver a fully PPCP-compliant Mac.

That begs the question of just what *is* a fully PPCP-compliant Mac. Per the PPCP spec, a system must be able to run all six of the possible OSs — Mac OS, AIX, OS/2, Solaris, Windows NT, and Novell's NetWare — to qualify as PPCP-compliant. Given that future versions of Windows NT for the PowerPC have met their maker, that definition may no longer be valid, so Apple may have lost interest in its future Macs being able to run *any* non-Mac-specific operating systems.

But Apple still has an interest in lowering the cost of its Mac systems by adopting some of the PC standards PPCP supports. Apple will probably ship hybrid systems that incorporate some PPCP chip sets but that will most likely also contain some Apple-proprietary hardware (as for PC ports, don't count on them). Look for the first such system, a Power Mac 7300-class machine, in early August.

DayStar Digital. Of all the Mac-clone vendors, DayStar has the most aggressive schedule for delivering PPCP systems. The company hopes to deliver its first offering as early as June.

DayStar hopes to utilize PPCP technology to create a workstation-class system that can challenge those from Sun and Silicon Graphics in the digital-video market. DayStar is talking to IBM and UMAX about the design of new memory architectures tuned to improve multiprocessor performance and will likely license a logic-board design from one of the two firms. DayStar believes that the combination of memory-architecture improvements and faster PowerPC processors can result in quad-processor Macs that perform multiprocessor-savvy tasks two to three times as fast as today's quad-processor Macs.

Motorola. Motorola's first PPCP system, due this fall, will likely be based on the company's Viper logic-board design, which has a 66-MHz system bus. Motorola plans to quickly follow its initial PPCP offering with systems designed with a higher-performance logic board that has a bus speed as high as 83 MHz.

Motorola's PPCP machines will include a parallel port, and the company is working on a deal to bundle drivers for a host of popular PC printers. It will offer PC keyboard, mouse, and serial ports as an option. Motorola's first PPCP machine will be in the midrange, with a processor speed starting at 200 MHz. Over time, the company will move its entire Mac OS product line over to PPCP.

Power Computing. Power was the least definite about its PPCP plans. It would say only that its first PPCP machines would be midrange and high-end. But don't mistake the company's lack of specifics for a lack of interest — Power is actively pursuing a variety of PPCP options. It is looking at IBM's and Motorola's logic-board designs and at various chip sets and is also seriously considering creating its own. At press time, Power hadn't decided which approach would best let it meet its goal of offering high performance for a low price.

UMAX. The high-end-workstation market is the first target for UMAX's PPCP systems, due out in the fall. UMAX is working on a new memory architecture that it claims will deliver significant performance gains over today's Mac OS systems. The company also plans to incorporate Ultra SCSI, DVD, and USB (a high-speed serial peripheral bus) in its initial PPCP offering. It may even ship its systems with USB keyboards and mice. There's a good chance that UMAX's PPCP systems will have a parallel port, but they're unlikely to have PC serial, mouse, and keyboard ports.

THE VERDICT

/ not surprisingly, the holdup is the Mac OS

WHILE EVERYONE HAS BEEN paying attention to Apple's Rhapsody plans (when they haven't been paying attention to Apple's stock price), the PowerPC Platform has been slowly — too slowly — edging closer to its debut. PPCP systems were originally due to ship a year ago. Ironically, the holdup isn't the hardware; it's making the Mac OS run on a PPCP system — and this requires a major OS rewrite.

As the task of porting the Mac OS to this new hardware platform has dragged on, customers have all but forgotten about Apple's PPCP effort. Yet the arrival of PPCP systems and enabling software later this year will be as significant a step forward for the Mac as the release of Rhapsody in 1998.

Why? Because Apple's decade of refusal to license the Mac OS has resulted in an OS that is completely dependent on proprietary Apple hardware. Clone vendors haven't been able to expand the possibilities for Mac OS systems, and even Apple has been trapped by its own legacy, delivering new system designs only occasionally. PPCP will let clone makers fill in the gaps, expanding customer choices far beyond today's range of options and bringing innovation to market at an accelerated pace. PPCP will be the key that lets licensees deliver everything from sub-$1,000 Mac OS systems (finally) to ultrahigh-performance workstation-class machines that can give those from Sun and Silicon Graphics a run for their money.

But without a PPCP-compliant OS, PPCP hardware is nothing. There are signs that Apple is at last ready to set a date for delivering the Mac OS for PPCP — and to ship it on schedule, come hell or high water. We support this strategy. It may mean, as it did with Mac OS 7.6, that the first release of the Mac OS for PPCP doesn't include everything on the original feature list. And this in turn may mean that clone vendors will remain more restricted in what they can accomplish than they would like in the first round of PPCP systems. It's unfortunate, but not as unfortunate as continued delay.

Clone vendors are chomping at the bit to ship PPCP systems. Some of them have hardware that's ready to go out the door once the OS is finished. But when asked when they'll have systems available for customers to purchase, they all sing the same refrain: When Apple gets us system software.

Our advice to Apple: Ship it, and move on.

THE BIG PICTURE

The early returns for PPCP are encouraging. Even with prototype hardware and alpha system software, PPCP systems have already demonstrated significant performance improvements. And from the details clone vendors have shared with us about their PPCP plans, it looks as though we're on the brink of a new era of Mac-hardware innovation. PPCP could well be the means by which the Mac restakes its claim to leadership in the personal-computer market.

Henry Bortman is *MacUser*'s technical director.

The latest version of the MacBench benchmark software is available online on ZD Net from Ziff-Davis Benchmark Operation at http://www.zdnet.com/zdbop/.

Network bottlenecks? GONE.

Sluggish file transfers? EXTINCT.

New storage technologies combine the convenience of networking with file-transfer speeds faster than you ever thought possible.

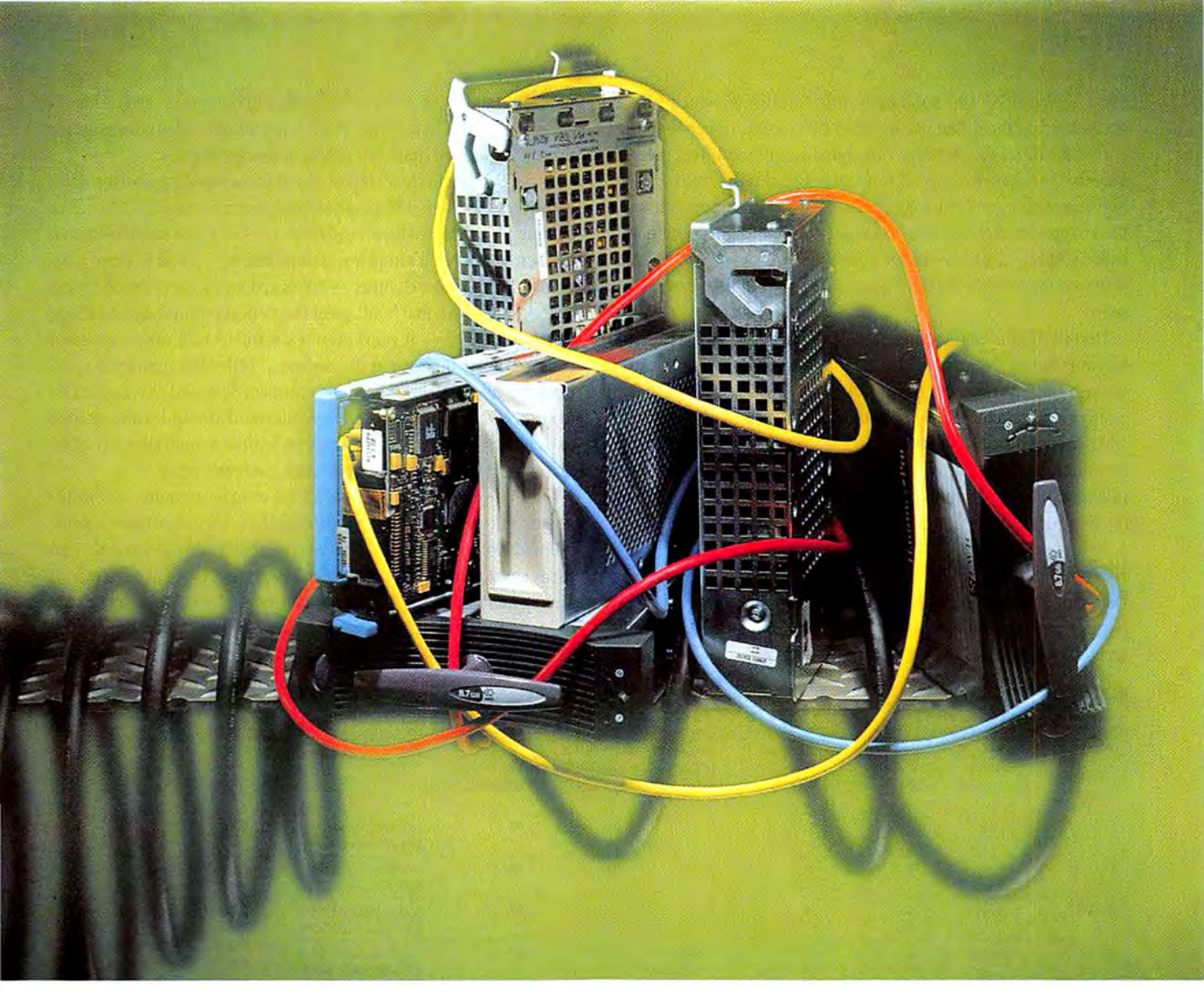
THE FUTURE OF STORAGE

THE BIGGER THEY ARE, THE SLOWER THEY MOVE. Yes, we mean files. The kind of files you know all too well if you work with digital artwork, audio tracks, or video clips. When you open a 100+-MB Photoshop file that's stored on even the speediest hard-disk drive, you'd better be prepared to wait. And when you try to upload that same pixel-packed behemoth onto your workgroup server over your Ethernet LAN, you might want to slip out for a burger and fries while your artwork competes for bandwidth with all the rest of the network traffic.

The situation's even worse — much worse — if you're a digital-video professional. Not only are your files gargantuan — a ten-minute full-screen video can easily consume over 5 GB of RAID real estate — but, more important, your video-editing card also needs digital-video data *right now,* not whenever your hard drive and SCSI cable can manage to deliver it. Real-time video editing requires steady, reliable, ultrahigh-speed data flow. And if you want to share a massive video file with another Mac, you can forget about your LAN — why do you think MicroNet, MegaDrive, and others make removable-mechanism hard-disk subsystems?

BY RIK MYSLEWSKI AND KRISTINA DE NIKE

PHOTOGRAPHY / MICHAEL FALCONER



No, if you're a content-creating professional, a local hard drive or RAID system attached to your workgroup's Ethernet network just doesn't cut it anymore. You and your coworkers need shared access to multiple gigabytes of image, audio, and video files that's as quick as though each of you were individually connected to one of the fastest storage systems available today. In other words, you need network convenience at RAID-system speed.

If we've just described your predicament, we've got some good news and some bad news: The good news is that help is on the way, in the form of a handful of competing high-speed storage-network technologies. The bad news is that we just spent a couple of weeks testing a few representatives of this new generation, only to discover that they're still more than a little bit wet behind the ears.

THE END OF THE PARALLEL UNIVERSE

Before we begin to explain what the storage-technology revolution is all about, we should clarify what it's *not* about: the death of SCSI (Small Computer System Interface). It's only the death of SCSI as we know it — SCSI based on moving separate, *parallel* streams of data.

If you've ever looked at a SCSI port — and you probably have, since they've been on every Mac since the Plus appeared, in early 1986 — you know it's built to hook up to a thick cable full of wires. The port accepts a 25-pin connector, with each pin leading to a wire in that heavily shielded, chubby cable. The wires carry signal, control, or address information; provide termination power; or supply a universal ground. The 25-wire requirement blossoms to 50 when ground wires are added for each signal, as required by most storage devices. The situation gets worse when the storage device to be connected is of the Wide SCSI type, in which 16 bits of information are passed in parallel, as opposed to 8 in standard SCSI; the wire count jumps to 68.

That's a lot of expensive wire, connectors, and shielding. When SCSI first appeared, this expense was necessary, because silicon chips couldn't work as fast as they do today. (The microprocessor in the Mac Plus, for example, lumbered along at 8 MHz.) Back then, controller chips, which are silicon-based, couldn't handle a bunch of data coming in one very fast data stream but they could cope with slower streams of data delivered in parallel. As silicon-chip speed increased, however, and allowed for faster parallel streams, parallelism became a liability. It became harder and harder to keep all those parallel signals marching along in perfect harmony, and the distances they could travel before they got out of sync became shorter and shorter (see the "Battling Storage Standards" table).

Clever engineers have developed improvements to parallel-SCSI technology that battle the speed and cable-length limits of traditional,

single-ended, SCSI. One solution is *differential SCSI,* which is based on measuring the difference between two signals rather than measuring the difference between one signal and ground. This gives engineers more-precise control over each signal pulse, thus allowing higher speeds as well as longer cables. The next improvement, scheduled to appear later this year in a new parallel-SCSI implementation called Ultra2, will be *low-voltage differential,* which — because it uses shorter, more closely spaced signal pulses — promises even greater speed.

Despite all this engineering ingenuity, though, the need for parallelism is fading. Now that chips can handle bits at rates unheard of ten years ago, it's more effective just to line up bits of data one behind another and ram them down a simple digital pipe as quickly as possible. That's the beauty of the new *serial* technologies: no costly cables, no minuscule bus lengths, no complex parallel choreography, no termination hassles, no conflicting SCSI-ID numbers. Just a lot of data moving very quickly down a long, thin, cheap cable.

SHARE AND SHARE ALIKE

Data zipping down serial cables still obeys SCSI commands, as set out in a new set of specifications called SCSI-3 (which also includes an updated parallel-SCSI specification). But although SCSI-3 doesn't ignore parallel SCSI, it offers much more in the way of serial schemes — three options, in fact. And these schemes offer a big advantage for users who want to share fast access to storage devices.

Serial SCSI can ride on top of any of three rapidly maturing data-transfer technologies: SSA (serial storage architecture), FC-AL (fibre channel — arbitrated loop), and IEEE-1394 — more snappily known by the name of Apple's implementation: FireWire. A fourth serial technology, FC-EL (fibre channel — enhanced loop), is a planned hybrid of SSA and FC-AL that holds great theoretical promise, but it's a long way from reality — it won't even reach final specification-approval stage until late this year at the earliest. A fifth, USB (universal serial bus), is a low-cost, low-speed interconnect designed to connect PCs to keyboards, mice, joysticks, telephones, and low-end scanners. Due to its low speed, its storage use will be limited to midrange CD-ROM drives — if that. No Mac specification currently exists.

SSA, FC-AL, and FireWire each have unique strengths and weaknesses, but — possibly most important — they also share a common advantage over parallel SCSI: the ability to transparently and easily share multiple storage devices (and other types of devices too) among multiple Macs, PCs, and other workstations. We're not talking only about small workgroups either. SSA and FC-AL max out at a full 127 devices per setup; FireWire can handle a cool 63. All files on all

Battling Storage Standards / which bus will *your* data get on?

Technology	When Widely Available	Maximum Throughput (MB/Second)	Maximum Devices per Bus	Maximum Bus Length (Meters) Single-Ended	Differential	Low-Voltage Differential	Pros	Cons
PARALLEL								
SCSI-1	now	5	8	6	NA	NA	External port on all Mac OS systems.	Slow.
Fast SCSI	now	10	8	3	NA	NA	Internal port in many Mac OS systems.	Too slow for most DTP and all DTV uses.
Fast Wide SCSI	now	20	16	3	25	NA	Acceptable speed for DTP and some DTV uses.	Cabling becomes a major problem when using any type of SCSI system faster than Fast SCSI. Maximum total bus length shrinks dramatically on traditional single-ended systems, and cable costs increase. Also, high-speed SCSI fulfills its promise only when costly RAID arrays are used.
Ultra SCSI	now	20	8 or 4, depending on bus length	1.5 (if 8 devices max.) or 3 (if 4 devices max.)	25	NA	Acceptable speed for DTP and some DTV uses.	
Wide Ultra SCSI	now	40	16, 8, or 4, depending on bus length	NA (if 16 devices max.) or 1.5 (if 8 devices max.) or 3 (if 4 devices max.)	25	NA	Very good speed for DTP and many DTV uses.	
Ultra2 SCSI	late 1997	40	8	NA	NA	12	Very good speed for DTP and many DTV uses.	
Wide Ultra2 SCSI	late 1997	80	16	NA	NA	12	Excellent speed. Supports up to 16 drives.	
				Maximum Distance Between Devices (Meters)				
SERIAL								
SSA (serial storage architecture)	now	80*	127		25		Easy to use and manage. Highly efficient in multiclient setups.	Slower technology than FC-AL. Only one major drive vendor (IBM).
FC-AL (fibre channel — arbitrated loop)	mid-1997	200†	127		30		Highest speed of all existing technologies. Multiple drive vendors.	More expensive than SSA. Current systems not yet reaching full potential.
USB (universal serial bus)	1998	1.5	127		5		Very inexpensive serial bus for mice, keyboards, joysticks, phones, and so on.	Only appropriate storage use is for CD-ROM drives. No Mac specification yet.
FireWire (Apple's version of IEEE-1394)	1998 – 1999 (for storage)	25§	63		10		Easy to use. Promoted by Apple. Sony support as digital-video standard.	Modest speed compared to other serial technologies. No storage-vendor support.
FC-EL (fibre channel — enhanced loop)	1999 – 2000	200 – 400 (est.)	undetermined		undetermined		Combines the best of SSA and FC-AL. Will be very fast and versatile.	Too early to estimate cost. Backward compatibility and final speed unclear.

*Two channels, each reading *and* writing at 20 MB/second simultaneously. †Two channels, each reading *or* writing at 100 MB/second simultaneously. §Specification allows for 50 MB/second; hardware under development.

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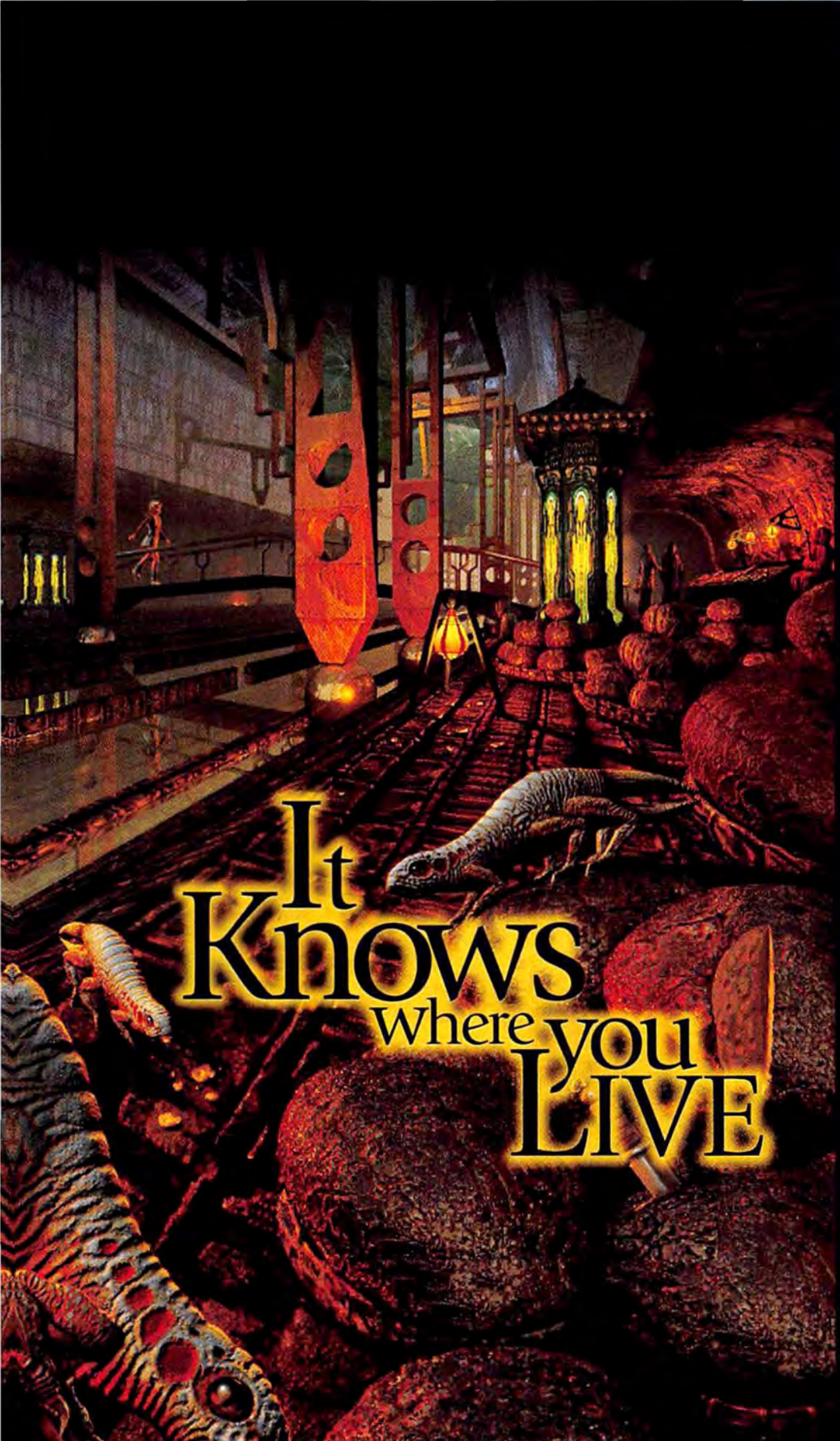

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devices are always accessible — theoretically — at full serial speed.

The advantages are obvious — but so are the challenges. If all users have access to all files, for example, what is there to stop two users from reading, modifying, and overwriting the same file at the same time? Don't ask the SSA-, FC-AL-, or FireWire-hardware vendors; they'll say, and rightly so, that it's a software problem. Unfortunately, it's one that the Mac's aging file system makes fiendishly difficult, and one that hasn't yet been adequately addressed in the few pioneering serial-SCSI storage systems currently available for the Mac (see the "Future's Not Here Yet" sidebar).

SERIAL SOAP OPERAS

An entire made-for-TV miniseries could be written about the alliances made and broken, careers created and destroyed, promises made and ignored, and intricate behind-the-scenes machinations that have led to the current state of serial storage technology. Of course, none of this intrigue means much to you as you plug in your new serial storage system — except that decidedly nontechnical influences continue to shape the serial-storage landscape.

Take SSA, for example. It was introduced by IBM in 1992 as a high-end storage interconnect and was soon championed by such drive-manufacturing powerhouses as Connor and Micropolis. Today, however, Connor has been absorbed into FC-AL-loving Seagate, where its SSA efforts were terminated. Ailing Micropolis was recently bought by Singapore Technologies, where its SSA efforts have become, shall we say, less than fully vigorous. That leaves IBM as SSA's sole champion. Granted, many technologies with less powerful friends have flourished, but SSA's single-source status is an inarguable drawback.

FireWire, on the other hand, has lots of friends — the problem is that none of them make storage systems. Sony is putting FireWire interfaces on its latest digital-video cameras, and Adaptec, Miro, Radius, and Texas Instruments are showing or shipping FireWire PCI cards for the Mac. But despite Apple's enthusiastic backing — or, if you like conspiracy theories, because of it — FireWire-based hard drives have yet to emerge from manufacturers' labs. Apple has promised that FireWire is in line to become its standard consumer-level storage and video interconnect, but the lack of currently shipping products keeps us from holding our breath. FireWire will almost certainly have a distinguished career as an audio and video interconnect, but its storage future is cloudy.

FC-AL, on the other hand, is gaining momentum. Although it was also originally developed by IBM, FC-AL is now being championed by a legion of manufacturers. Seagate, Hewlett-Packard, and Quantum, for example, are just a few of FC-AL's heavyweight friends.

Although IBM has already shipped multiple terabytes' worth of SSA drives, mostly for high-end systems, and despite the fact that Pathlight Technology has shipped a high-quality SSA card for the Mac, it's a fair bet that the FC-AL juggernaut will come rolling into your Mac-based workgroup within the year. SSA is easy-to-use, solid technology, but FC-AL has a bigger army.

THE DEVIL IS IN THE DETAILS

FC-AL partisans argue that their technology is fated to win the serial wars, due to its higher speed: A dual-channel FC-AL system can theoretically achieve an astonishing 200-MB-per-second transfer rate. A dual-channel SSA setup, in contrast, currently maxes out at 80 MB per second. SSA proponents willingly concede FC-AL's brute power

ILLUSTRATION / ANNIE BISSETT

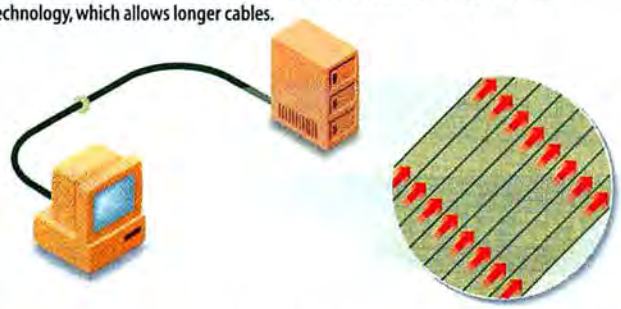
PARALLEL CHALLENGERS

/ two new serial technologies vie to unseat parallel SCSI

FOR OVER TEN YEARS, Macs have used parallel SCSI to connect to their storage systems. Today, parallel SCSI's dominance is being challenged by not one but two new *serial* connection schemes: SSA (serial storage architecture) and FC-AL (fibre channel — arbitrated loop). Of the two, FC-AL has the faster raw speed, but SSA is more efficient. Unlike parallel SCSI, both are designed to connect up to 127 nodes — computers as well as storage systems — on one shared bus.

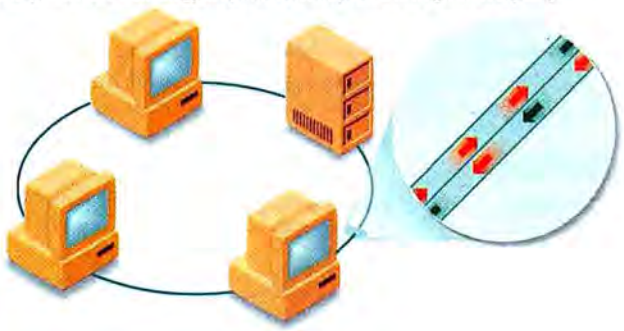
THE CURRENT MAC STANDARD: PARALLEL SCSI

Although each data-carrying signal in a parallel-SCSI system moves relatively slowly compared to those in SSA and FC-AL systems, high throughput (up to 40 MB per second at present and up to 80 MB per second when Wide Ultra2 comes out) is obtained because multiple streams of data are transferred in parallel — but only over either short and expensive cables or by the use of even more-expensive *differential SCSI* technology, which allows longer cables.



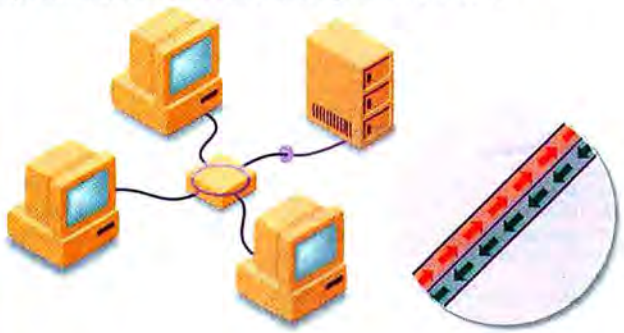
SERIAL CONTENDER #1: SSA (serial storage architecture)

Each device in an SSA loop is connected to two other devices by way of two bidirectional cables. Each can read and write simultaneous signals from multiple sources at 20 MB per second, resulting in an overall throughput of 80 MB per second. SSA's *spatial reuse* technology keeps the SSA bus packed to its greatest capacity.



SERIAL CONTENDER #2: FC-AL (fibre channel — arbitrated loop)

Each FC-AL cable can read and write at 100 MB per second; FC-AL setups thus max out at 200 MB per second. However, only one read and one write transaction — albeit very fast ones — can take place on an FC-AL loop at one time. Note that with FC-AL, the loop is contained within a hub rather than being external to all devices.



but counter that theirs is a more subtle technology, better suited to multinode workgroup environments.

To follow the argument, you need to understand just how different the two technologies are — and how different they are from parallel SCSI (see the "Parallel Challengers" sidebar). Unlike parallel SCSI, both FC-AL and SSA are loop-based technologies — that is, both require that data circulate in a loop, with each node taking its place on the loop's circumference. (In most FC-AL setups, the loop itself is within a hub, but the topology remains loop-based.) The *AL* in *FC-AL* stands for *arbitrated loop*, meaning that only one node at a time can use the loop to read data from or write it to another node. If another node tries to use the loop during this transfer, it's told to wait. Fortunately for FC-AL proponents, the speed of FC-AL makes that wait a short one. A very short one.

SSA is more efficient. Each SSA device — card or drive — has two ports. Each port has two channels. At SSA's current level of development, each channel can pump data at 20 MB per second: 20 MB times two channels times two ports equals SSA's maximum total throughput of 80 MB per second. What's more, each SSA port can read and write data simultaneously, enabling an SSA loop to carry on four data *conversations* at each node at any one time — a trick, by the way, that the Mac OS' current clunky file-management system can't take advantage of.

SSA enthusiasts claim that their system's trump card is that its loop is not limited to one node's use at any time, as is an FC-AL loop. A much debated SSA concept called *spatial reuse* holds that the entire loop, at any instant, can be filled with multiple read/write conversations originating from or bound for any other node. Sure, SSA fans say to FC-AL proponents, your technology is great for simple high-speed file transfers, but ours is better for multiple transactions among multiple nodes.

BOOKMARK

RELATED INTERNET SITES

- **Fibre Channel Loop Community home page**
  Links to Fibre Channel-related publications and information.
- **SCSI Trade Association home page**
  Links to SCSI-related news, documents, and events.
- **SSA Industry Association home page**
  Links to SSA-related documents, news, and product information.

GO TO http://www.zdnet.com/macuser/0597/html.#storage

THE FUTURE'S NOT HERE YET / *MacUser Labs compares high-speed parallel-*

CREATING A HIGH-SPEED storage system for the Mac is not easy. The Mac OS and Mac motherboards contain bottlenecks that can choke even the fastest file transfer.

Over the years, storage vendors have discovered lots of tricks and techniques to squeeze every possible bit of speed out of parallel-SCSI systems. Similarly, we expect it'll take the designers of Mac-based serial-SCSI systems a while before they can fully exploit the raw power of both SSA and FC-AL.

To find out just how far along serial-SCSI system engineers are in their ongoing efforts to bring SSA and FC-AL to the Mac, we assembled and tested a group of high-powered storage systems — two ambitious parallel-technology systems and the only three serial-technology systems shipping at press time.

Representing the state of the art in parallel SCSI was a StreamLogic SledgeHammer•Pro Differential Wide Ultra SCSI RAID system connected to a StreamLogic JackHammer PCI card. We also looked at an innovative attempt to provide shared parallel-technology storage by testing the ATTO AccelNet Differential Fast Wide SCSI networking hub connected to a SledgeHammer•Pro and an ATTO ExpressPCI-PSCd card.

Our serial-technology competitors included two SSA systems — a La Cie Speed2 SSA system and a Pathlight ImageNET-1 PCI card coupled with a Siemens Nixdorf SSA Disk Drawer 4 array — and a Transoft StudioBOSS FC FC-AL system. All testing, both parallel and serial, was done on Power Mac 9500/200s.

To get a feel for how each system would perform in a single-user publishing environment, we used MacBench 4.0's Publishing Disk test, which replays File Manager calls from Photoshop and QuarkXPress. To mimic digital-video-editing use, we used MacBench 4.0 to clock each system's speed when reading and writing large-block (1,024K) files.

We then compared the Pathlight/Siemens Nixdorf and Transoft StudioBOSS systems, both using Transoft's StudioBOSS multiuser software, in a multiple-host video-editing environment (La Cie's multiuser software was not shipping at test time). We also attempted to compare these two serial systems with a parallel system connected through an ATTO AccelNet, a parallel-SCSI hub that allows multiple Macs to share multiple hard drives. However, the test we chose, although representative of conditions in a real-world video-editing workgroup, consistently crashed the Macs that were connected to the AccelNet hub.

Both parallel-SCSI systems handily outperformed the serial systems in most single-user tests, proving that parallel SCSI still has its place in single-user, single-device setups. Serial SCSI's greatest current benefit is its ability to support multinode file sharing. We look forward to reopening the competition as serial technologies mature.

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ATTO Technology
Amherst, NY
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http://www.attotech.com/
AccelNet as tested, $11,100 (three cards, AccelNet hub, software, cables)
AccelNet, two-host port, $5,995; three-host port, $6,990
AccelWare software, four users, $1,995
ExpressPCI-PSCd, $545
Wide Diff cable (10 feet), $160

La Cie
Beaverton, OR
800-999-0499
503-520-9000
http://www.lacie.com/
Speed2 as tested, $11,999 (one card, four 4-GB drives)

Pathlight Technology
Ithaca, NY
800-334-4812
607-266-4000
http://www.pathlight.com/
ImageNET-1 as tested, $11,985 (three cards)
ImageNET-1, $3,995 per seat

Siemens Nixdorf/Digital Marketing International
Jamesburg, NJ
908-521-1370
http://www.sni-usa.com/
SSA Disk Drawer 4 as tested, $13,970 (four 4-GB drives)
SSA MiniTower with four 4-GB drives, $12,000

StreamLogic
Menlo Park, CA
415-325-4392
http://www.sledgehammer.com/
SledgeHammer•Pro as tested, $12,989 (one card, four 9-GB drives)

Transoft Technology
Santa Barbara, CA
800-949-6463
805-897-3350
http://www.transoft.net/
StudioBOSS FC as tested, $34,980 (three cards, four 9-GB drives)
StudioBOSS FC two-user system with four 9-GB drives, $29,985
Additional workstation, $4,995 (card and StudioBOSS software)

PARALLEL SYSTEMS

★★★★½ STREAMLOGIC SLEDGEHAMMER•PRO
(Differential Wide Ultra SCSI)
As serial technologies work through their growing pains, Wide Ultra SCSI remains the fastest technology for connecting a single Mac to a high-speed RAID system — that is, until Ultra2 SCSI and Wide Ultra2 SCSI systems appear later this year. The StreamLogic SledgeHammer•Pro is an exceptionally fast — and beautifully designed — example of a Differential Wide Ultra SCSI RAID system.

★★ ATTO ACCELNET
(Differential Fast Wide SCSI networking hub)
By using a hub-based system to connect multiple parallel-SCSI devices with multiple Macs, ATTO is attempting to emulate the shared-device convenience and versatility of serial-SCSI systems. Great idea — too bad the buggy ATTO AccelNet system we tested crashed every time two or more Macs tried to access the same drive.

FC-AL advocates pooh-pooh the spatial-reuse concept. They also point to studies that show their technology to hold up just fine, thank you, under enormous transaction loads. As might be guessed, SSA backers counter with their own graph-crammed white papers, claiming that FC-AL, despite its superior bandwidth, isn't intelligent enough to take full advantage of complex RAID subsystems. What's more, they say, SSA is cheaper — and the FC-AL folks can't argue with that.

THE BOTTOM LINE

At this early phase in the serial-SCSI horse race, handicapping a winner requires examining each contestant's lineage and weighing the claims of its fans. The real race is yet to be run. With products only now taking their first faltering steps into the Mac market, our testing was doomed to be inconclusive regarding the SSA-versus-FC-AL battle (see the "Future's Not Here Yet" sidebar) — even though we were able to prove the viability of both technologies and to contrast them in their nascent state with the speedy, mature Wide Ultra SCSI.

But perhaps a more telling gauge of the value of SSA and FC-AL is that representatives from Adaptec, Seagate, IBM, and other interested parties are hunkering down together as you read this, working away on FC-EL, a Grand Unified Theory of serial storage that will combine the most effective and efficient aspects of both SSA and FC-AL into a high-performance serial storage technology for the next millennium.

But what if you and your workgroup can't wait for that proverbial bridge to the 21st century before you invest in a fast file-transfer system? Our advice: If all you need to do is blast files from one Mac to one local RAID array, stick with parallel Wide Ultra SCSI — or, soon, Ultra2 SCSI. You'll save money and still be able to use your old pre-Ultra SCSI drives (although if you do, your entire SCSI chain will drop to the speed of the slowest protocol for all attached SCSI devices). However, if you're a deep-pockets digital-video or publishing professional who needs to share large files at high speed with members of your workgroup, look into serial systems — SSA today and FC-AL later in the year.

Executive Editor Rik Myslewski's first storage system was an 8-inch, 128K floppy drive. MacUser Labs Test Manager Kristina De Nike was once nearly electrocuted when she slipped her hand into a drive enclosure.

and serial-SCSI systems

SERIAL SYSTEMS

★★★★ PATHLIGHT IMAGENET-1 PCI CARD/SIEMENS NIXDORF SSA DISK DRAWER 4

(SSA)

Pathlight is the leader in serial-SCSI technology for the Mac. Combining its ImageNET-1 card and Transoft's StudioBOSS software with a rugged multidrive assembly from Siemens Nixdorf creates a fast, reliable multi-Mac storage network. We were especially impressed with how easy the entire system was to configure.

★★★½ LA CIE SPEED2

(SSA)

La Cie has put its label on a Pathlight PCI card and an IBM minitower SSA RAID array and given the pairing a price substantially lower than that of the Pathlight/Siemens Nixdorf combination. The only missing piece is multiuser software, currently under development. Once La Cie finishes that chore, the Speed2 should increase SSA's acceptance in the Mac content-creation community.

★★★ TRANSOFT STUDIOBOSS FC

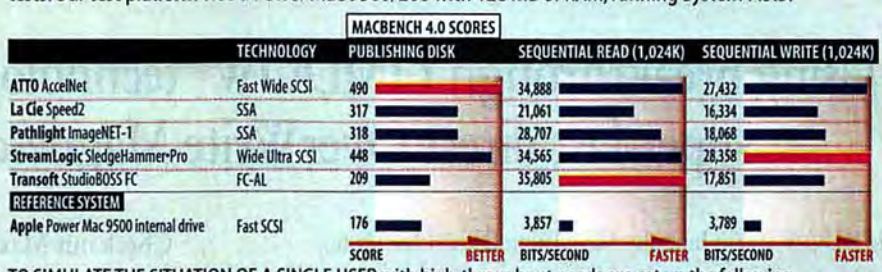
(FC-AL)

FC-AL should scream. The Transoft StudioBOSS FC doesn't — both because its first-generation FC-AL hardware is not up to snuff and because the Mac's PCI controller can't keep up with the Transoft FC-AL PCI card's method of caching and then bursting data streams. Transoft's StudioBOSS multiuser software may be inelegant and expensive, but using it is currently the only reliable way to take advantage of serial technology's multiuser, multidrive functionality.

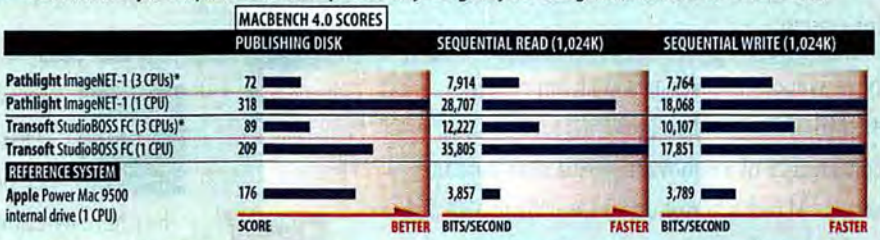
TESTING THE TECHNOLOGIES / *single-user and multiuser results differ widely*

MacUser LABS

JUST HOW FAST are these new storage technologies? To find out, we used MacBench 4.0 to test five representative systems in single-user setups and two in a grueling multiuser situation. MacBench 4.0 scores are relative to those of an Apple Power Mac 6100/60 with a 30-MHz memory bus, a 250-MB hard drive, 2 MB of built-in graphics RAM, and no L2 cache. This system is given a score of 100 for all tests. Our test platform was a Power Mac 9500/200 with 128 MB of RAM, running System 7.5.5.



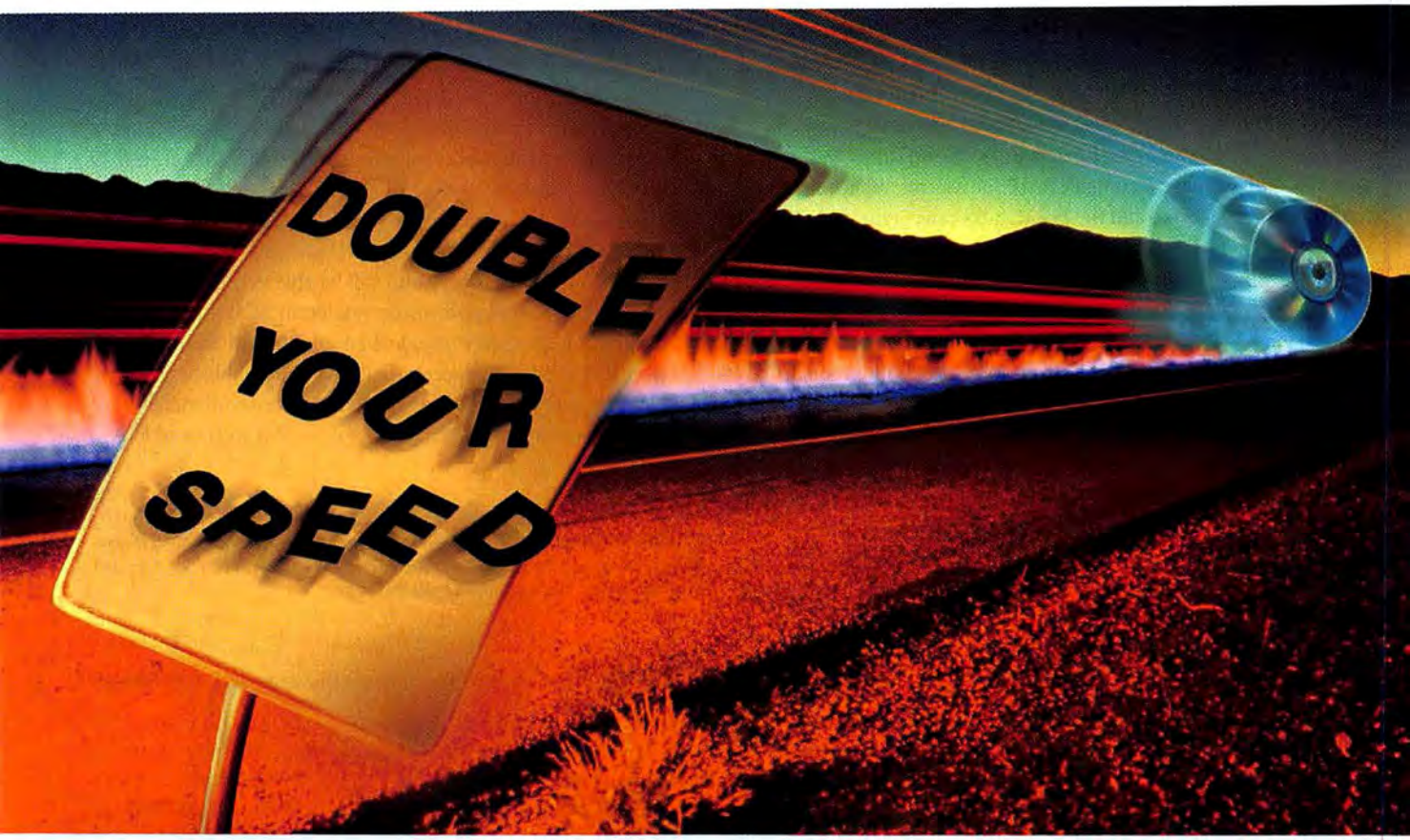
TO SIMULATE THE SITUATION OF A SINGLE USER with high-throughput needs, we set up the following configuration for each of the five systems tested: a RAID Level 0 array of four disks attached to each vendor's PCI card in a Power Mac 9500/200. Perhaps not surprisingly, given the newness of SSA and FC-AL and their multiuser orientation, the SSA and FC-AL-based systems couldn't match those based on parallel-SCSI technology for speed — but all these systems provided better speed than you'd get by accessing the internal drive on the 9500.



THE FACT THAT MULTIPLE USERS can share the same volumes is potentially a big advantage of serial architectures. Based on their specifications, SSA and FC-AL should each provide better throughput than Ethernet, saving your office time as well as money. But what happens to that throughput when multiple users are accessing a disk array simultaneously — and really pounding it?

To answer this question, we set up a loop of three computers and one four-disk RAID tower (partitioned into three volumes). Each volume in the RAID tower was striped across all four disks. The first computer was running a Media 100 300K-per-frame video clip on partition A. The second was running a 150K-per-frame video clip on partition B. We ran our MacBench tests on the third Mac at the same time. We tested the Pathlight ImageNET-1 (representing SSA) and the Transoft StudioBOSS FC (representing FC-AL). We tried to run the same tests on the ATTO AccelNet (representing Fast Wide SCSI), but the tests consistently crashed the system.

The results may appear disappointing at first glance, but they're actually fairly encouraging when looked at in perspective. Although both the SSA and FC-AL loops dropped to about a third of their single-user speed, each provided bandwidth greater than Ethernet on a Mac — and, in the Sequential Read and Write tests, the multiuser results were better than the single-user results of accessing the internal drive on the 9500.



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CIRCLE **22** ON READER SERVICE CARD

Learn to create images that look great no matter who's doing the looking.

By Lynda Weinman

Web Color Wizardry

IF WEB COLOR HAS YOU STUMPED, you're not alone. Maybe you're perplexed when Photoshop asks you to choose a "palette" for Web-ready GIF images, or maybe you're concerned when the site logo that looked great on your computer somehow looks dark and mottled on your neighbor's old Compaq. There's no magic to great Web graphics, but even if you're a pro at creating color graphics for print, creating color artwork for display on the Web requires a different way of thinking.

Unlike with print design, where the final publication looks the same to everyone, Web graphics' appearance varies depending on the operating system, video-card bit depth, and screen size the end viewer is using. As a result, the Web suffers from a central authoring irony — creators and end viewers of Web graphics almost always see a different picture.

Artists and designers who create images for the Web typically have higher-powered software and equipment than people who buy computers for general purposes. Anyone who's seriously involved in computer-based imaging probably has a Macintosh and a monitor that displays thousands or millions of colors. Many Web navigators use Wintel PCs with minimally configured systems that display graphics at 8 bits (256 colors). Ignoring how your pages will look on these low-end displays is like designing and proofing a magazine on thick glossy paper and then sending it off to your customers printed on newsprint.

In this article, you'll learn the ins and outs of color in the world of 8-bit graphics, so that you can create images that look great no matter who's viewing them.

Bits and Palettes

If you're used to working in Adobe Photoshop in RGB mode and have a 16- or 24-bit-color display (thousands or millions of colors), chances are you've never had to understand 8-bit graphics, because the colors assigned to your images have never been limited by the 256-color barrier. But understanding how these graphics work is critical to making good Web-design decisions, for two reasons: The predominant graphics file format, GIF, is 8-bit, and many viewers' monitors are 8-bit.

GIF images include color palettes, or predetermined sets of as many as 256 colors, which define which colors they will use. (These palettes are also called "color lookup tables," known in the industry as CLUTs, which rhymes with *mutts*). You can reduce an image to 256 colors or fewer by using one of two types of palettes — an adaptive palette, based on the colors already in the image, or a system palette, based on a computer platform's preset group of 256 colors. Adaptive palettes usually get the best results when the graphic is viewed on a monitor that has thousands or millions of colors (see figures 1 and 2).

The trick is that each operating system, be it the Mac OS, Windows, or Windows 95, also has its *own* palette that Web browsers use to reduce color information for 8-bit monitors. When people with 8-bit monitors view your site, their browsers — whether they're using Netscape Navigator, Microsoft Internet Explorer, or Spyglass Mosaic — convert the images to one of the system palettes, regardless of any adaptive palettes you might have used. In some cases, this hardly affects the way your images look, but in others, it wreaks havoc with your intended colors and image quality.

There's only one way to sidestep this risk effectively — by using a palette that is "browser-safe."

Fortunately for Web authors, the system palettes have 216 colors in common. All color monitors can display them, and all browsers on all platforms will show each color as is.

ILLUSTRATION / ELIZABETH LADA

These colors were chosen not for their beauty and usefulness; they were chosen from a mathematical color cube based on multiplying six values of six colors — red, green, blue, cyan, magenta, and yellow. This is why the browser-safe palette is sometimes called the 6x6x6 palette. It's also frequently called the Netscape palette.

Take a look at figure 3 to see the browser-safe palette. Also, check out the sidebar review of Pantone ColorWeb, a handy tool that adds the palette to the Apple Color Picker extension, making the palette a lot easier to use.

The browser-safe palette can save you much of the hassle and heartache of mangled graphics, but to get the best results, you need to know exactly how and when to use it. Follow these three general guidelines to create Web color everyone will see as you intended.

Three Steps to Better Web Color

1. Use browser-safe colors for text and backgrounds. If you don't use browser-safe colors when you select your site's background and text colors, the browser will convert the colors to browser-safe values for you. This can be problematic if a browser converts your text to the same color as the background, thereby making your page unreadable!

Web browsers use HTML (HyperText Markup Language) to display colored text, links, and background colors. There are two ways to specify color in HTML, either with hexadecimal values or with color names such as red, green, or lemonchiffon. Unfortunately, few of the named colors are browser-safe, so it's best to stick to browser-safe hexadecimal values when specifying HTML-based color.

The problem is that most Web authoring programs don't use hexadecimal values. Instead, they let you choose your background and text colors with the Apple Color Picker. The Color Picker works with RGB colors and displays these values in percentages instead of as numbers from 0 to 255. To translate from the color-picker percentages to browser-safe hexadecimal values, use the table in figure 4.

2. *Create* graphics with browser-safe colors. Line art, illustrations, cartoons, logos, and any artwork with a lot of solid color are best suited to GIF files, but it's very difficult and time-consuming to convert an existing graphic's color to fit the browser-safe palette and make it look good. You're better off building art with browser-safe colors from the ground up.

If you don't use browser-safe colors with graphics, the browser will convert your art to browser-safe colors, and this will cause ugly dots, resulting from dithering, to appear in the solid colors of your image. See figure 6 for an example — the bottom logo was created with browser-safe colors but the top logo was not.

If you use Photoshop to create your graphics, there's an easy way for you to get started using browser-safe colors right away. Download a palette named bclut2.aco (ftp://luna.bearnet.com/pub/lynda/). You're in luck if you own Photoshop 4.0, since it comes with this palette (Mode: Indexed Color: Palette: Web). Once you have the palette, load it into the Swatch palette. Then use the eyedropper tool to select and paint with the correct colors.

Important Warning! If you have a 16-bit display (thousands of colors), you will not be able to select or save the 216 colors reliably unless you switch your bit depth to 8 bits (256 colors) or 24 bits (millions of colors) *before* you save the artwork.

3. Save photographic images as JPEGs if you can, or save them as GIFs with adaptive palettes. JPEG is not an 8-bit format and therefore does not have a palette. As a result, if end viewers *do* have a monitor with thousands or millions of colors, they'll be able to see all the photo's colors. If the viewers don't, a browser will apply a system palette to your image on the fly, but unlike with colored text or nonphotographic

Colorful Examples

figure 1 / This 8-bit image looks good because it was created with an adaptive palette. An adaptive palette includes colors weighted in favor of those in the original image.

figure 2 / The same image, saved with the Mac OS system palette, dithers unattractively. The system palette includes fewer browns and earth tones than the image requires.

figure 3 / The browser-safe palette has 216 shared colors that work consistently across operating systems.

RGB	Percentages	HEX
255	100	FF
204	80	CC
153	60	99
102	40	66
51	20	33
0	0	00

figure 4 / Here's a handy table to help you convert the browser-safe RGB color values to their hexadecimal and percentage counterparts.

images, the browser will do a *better* job than you could.

There are times when you must save a photographic image as a GIF file, when you want to create an animation or a transparency, for instance. However, in such cases you will actually create a worse-looking image if you save a photo as a GIF file with the browser-safe palette. You will have forced the image into the lowest common denominator, even though end viewers with 16-bit or 24-bit systems could have seen better-looking results.

If you have to save a photographic image as a GIF file, do so with an adaptive palette. The adaptive image will not look much worse than the browser-safe one would on an 8-bit monitor, but it will look better on a 24-bit monitor. Take a look at figure 5.

File Size: One More Reason to Understand 8-Bit Graphics

What many Web authors don't realize is that the number of colors in a GIF image's palette affects not only its looks but also its file size. Basically, the fewer colors used in the image, the smaller the file size. For this reason, we recommend that in addition to using the browser-safe palette for graphics, you remove as many extraneous colors from the image's palette as you can. A few products can help you do this, including Digital Frontiers' HVS WebFocus (http://www.digfrontiers.com/) and Boxtop Software's PhotoGIF (http://www.aris.com/boxtop/PhotoGIF/).

Putting the Bits Together

Most designers like to have as much control as they can over how their Web pages look. For this reason, it's worth taking the time to pay attention to 8-bit-authoring issues. In the end, your site will benefit if you design it to look like you want it to over the widest range of operating systems and browsers.

If you're going to pick your own colors for backgrounds, type, text, links, and illustrations, why not choose browser-safe colors? There may come a day years from now when everyone has graphics cards that support more than 256 colors, but today the majority of systems do not.

Lynda Weinman is the author of three books on Web design, including <coloring web graphics>. *Her Web site is at http://www.lynda.com/.*

Pantone ColorWeb / welcome color tool for Web designers

PICKING THE RIGHT COLOR CAN BE DIFFICULT when you're designing for print, but at least there are tools to help. The same hasn't been true for the Web, until now. Pantone's ColorWeb, based on the company's line of print products, is an excellent and inexpensive tool that makes Web design easier.

ColorWeb has two parts: a printed swatch book, for picking combinations of browser-safe colors, and software that lets you access the 216 colors directly from the Apple Color Picker.

The addition to the Color Picker is most essential. Web authoring programs, including Adobe PageMill and Bare Bones Software's BBEdit, don't let you define colors by RGB values or percentages, and this can make it difficult to choose precisely. The swatch book eases design decisions by organizing samples of the colors in chromatic order and listing their equivalent values in RGB, CMYK, hexadecimal, and Hexachrome. Unfortunately, there's no accurate way to convert between CMYK values, which represent printing inks, and RGB values, which represent monitor colors, since some RGB colors can't be printed. The swatch book's numbers are really approximations. The printed swatches, although enhanced by special inks, also aren't exact.

Despite these limitations, ColorWeb goes a long way toward giving Web designers a basic set of color-picking tools comparable to those widely available for print.

Pantone ColorWeb ★★★★ **Price:** $29.95 (list). **Company:** Pantone, Carlstadt, NJ; 888-726-8663 or 201-935-5500; http://www.pantone.com/.

a

b

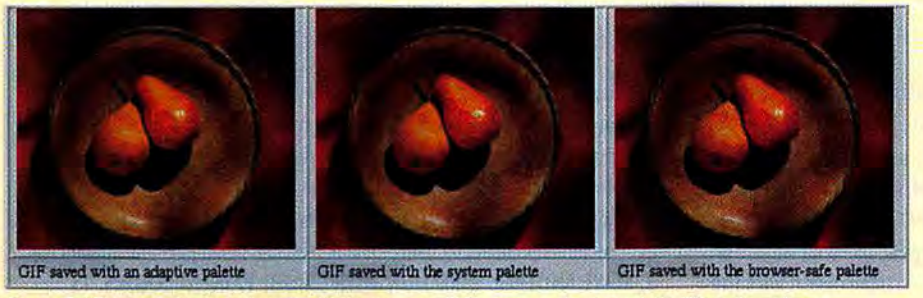


figure 5 / If you must save a photographic image as a GIF file, use an adaptive palette. When viewed on a monitor with millions of colors (a), a GIF image with an adaptive palette looks noticeably better than a GIF image saved with a system or browser-safe palette. When viewed on an 8-bit monitor with 256 colors (b), the GIF image with the adaptive palette looks as good as the GIF images with system and browser-safe palettes.

figure 6 / The bottom logo was created with browser-safe colors but the top logo was not. As a result, the top logo suffers from unattractive dithering. It's best to *create* artwork like this with browser-safe colors.

From Line Art to Fine Art

Follow these steps to transform a simple line drawing into something special.

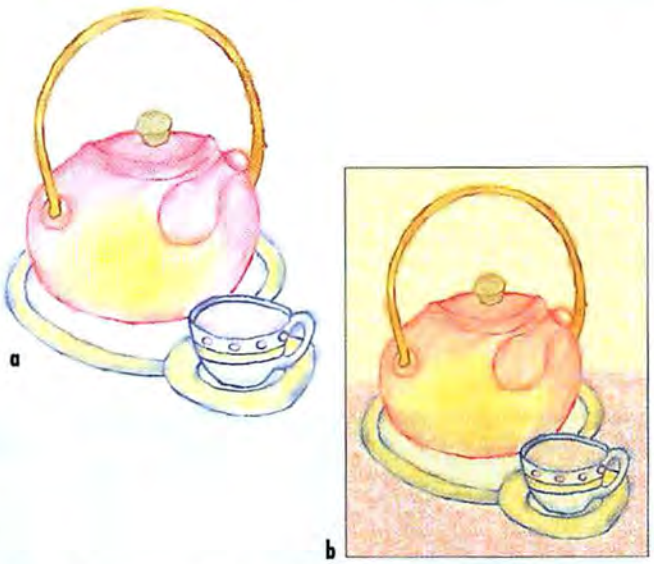
THINK SIMPLY. You don't always have to strain your brain for newer and cooler artistic effects, nor do you have to empty your pockets by paying someone to make something for you. When you need an illustration quickly that looks handmade, the solution may be no more complicated than using the preset brushes in Fractal Design Painter and an old-fashioned pencil.

In this piece, we'll show you how to take a scan of something you've sketched yourself (or a piece of black-and-white clip art) and turn it into a unique piece of art. Whether you're a novice or a pro, a little experimentation with Painter's standard brushes and a variety of colors and textures can get striking results. If you like, you can even open your Painter file in Adobe Photoshop to apply artistic filters.

Here we try three ways of enhancing one drawing and then combine sections of each version to create an eye-catching composite image on our own.

Janet Ashford is the coauthor of Start with a Scan: A Guide to Transforming Scanned Photos and Objects into High Quality Art *(Peachpit, 1996). Her Web site is at http://www.jashford.com/.*

1. DRAW, SCAN, AND TRACE A SIMPLE SKETCH.



2. TURN THE SKETCH INTO A TRADITIONAL WATERCOLOR DRAWING.

STEP BY STEP

1. DRAW, SCAN, AND TRACE A SIMPLE SKETCH. Use a pencil or a pen to make your own drawing, or find a piece of clip art. Scan the sketch in grayscale mode (a), open it in Painter, and create a copy (File: Clone). You'll want to create a ghost of the image to trace over, so select the image, delete it, and then choose Tracing Paper from the Canvas menu (Canvas: Tracing Paper). A faint copy of the sketch will appear. Use your mouse or, better yet, a pressure-sensitive tablet and stylus to trace over it with the Sharp Chalk brush (b).

2. TURN THE SKETCH INTO A TRADITIONAL WATERCOLOR DRAWING. Painter's chalk and watercolor brushes imitate basic and familiar art materials, so they can be good tools with which to start your experiments. To build up color gradually, set the brushes at less than 100-percent opacity in the Controls palette (Window: Controls). Fill in white areas with the Large Chalk brush set at 60-percent opacity, and then smudge the chalk strokes with the Just Add Water brush set at 50-percent opacity (a). To complete the digital watercolor, select a Hatching paper texture from the Paper palette (Window: Art Materials: Paper) and apply a color overlay (Effects: Surface Control: Color Overlay) at 40-percent opacity (b).

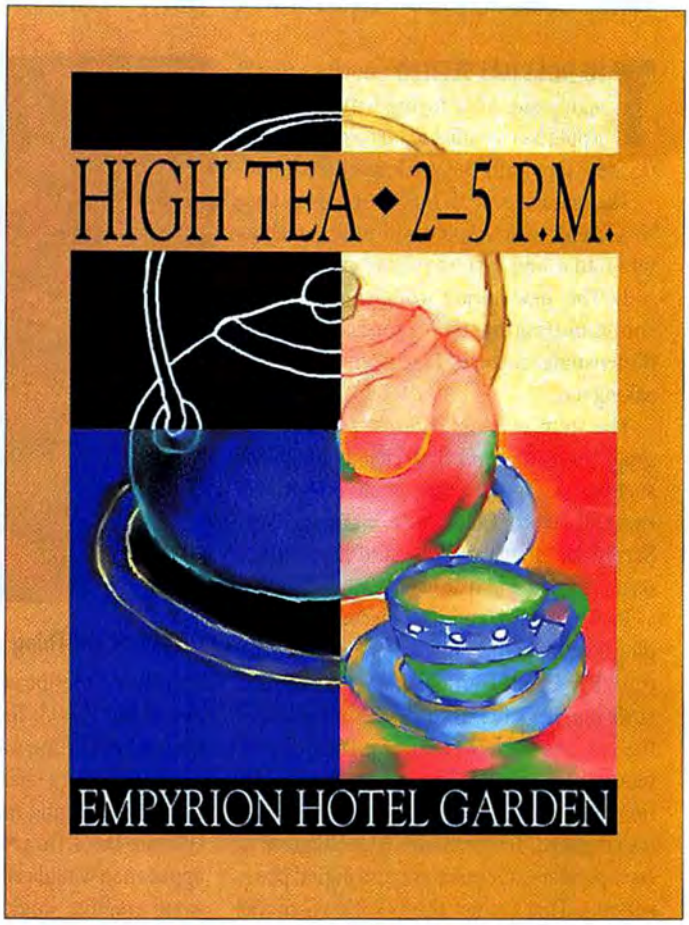
3. MAKE ANOTHER VARIATION WITH BRIGHT PAINTED COLORS. To create a different version of your artwork, begin with the colored line drawing you created (1b). Use Painter's Brushy brush tool to add colors broadly to white areas (a). Then exaggerate those colors by increasing the Dye Concentration (Effects: Surface Control: Dye Concentration). Create highlights along the outlines of the image and splotches of contrasting

a b

3. MAKE ANOTHER VARIATION WITH BRIGHT PAINTED COLORS.

a b

4. USE PHOTOSHOP TO CREATE A DRAMATIC INVERSION.



5. COMBINE YOUR VARIATIONS TO MAKE A STRIKING COMPOSITE.

color with the Big Dry Ink brush. For a finishing effect, blend the edges of the painted areas with the Just Add Water brush (b).

4. USE PHOTOSHOP TO CREATE A DRAMATIC INVERSION. For a more dramatic effect, begin by opening your smudged chalk drawing (2a) in Photoshop. Add a soft color to the background by selecting the white background with the magic wand and applying a wide feather (Select: Feather). The feather will fade the color around the object's edges. Use the eyedropper to sample a color from your image (in our case, yellow), and then choose Fill (Edit: Fill). In the Fill dialog box, set opacity at 50 percent and choose Darken in the mode pop-up box (a). Next, make the color more vivid by increasing the image's contrast (Image: Adjust: Levels). Last, create a dramatic negative (Image: Adjust: Invert) of your image (b).

5. COMBINE YOUR VARIATIONS TO MAKE A STRIKING COMPOSITE. Can't decide which variation you like best? Combine several in Photoshop. Start by inverting the original line drawing (Image: Adjust: Invert). Use this image as your base. Use the marquee tool to create a rectangular selection area that takes up a quarter of the image. If you have Photoshop 4.0, turn on the grid (View: Show Grid) to measure accurately. Save your selection area (Select: Save Selection). Then open a color variation and load the selection area (Select: Load Selection), making sure to choose the base image as the source in the pop-up menu. Use the selection area to copy a quarter of the color variation, and paste the corner into the base image (Edit: Paste Into). Repeat this process to paste different color variations into the other two corners of the base image.

EXPERT TIPS / By Bob Schaffel and Chuck Weger

Publishing's NeXT Life

What does Apple's acquisition of NeXT mean for publishing professionals? The stakes are high.

THE DUST HAS SETTLED from the Mac OS stampede. After toying with the BeOS, Apple has decided to buy NeXT and the OS Steve Jobs built. But you know that by now.

The real news in all this is OpenStep (née NeXTstep), which Apple will now somehow fold into a new system release called Rhapsody. This new release will give us all those cool multitasking, multiprocessing, multidimensional features Mac users have been asking for.

The item of most interest to us in the graphic arts (aside from obvious questions such as, Can Apple really pull this off?) is, Will this new OS use QuickDraw or Display PostScript? In other words — and here's a $20 term — what will its *imaging model* be?

In the last two issues, we discussed debugging PostScript files (March '97, page 116, and April '97, page 82), a ritual that's been required since the Dawn of Desktop Publishing. One of the reasons we have to debug PostScript is because things often get lost in the translation from QuickDraw (the Mac's native graphics language) to PostScript (the language of laser printers, imagesetters, and digital platesetters). That's when the WYSIWYG model breaks down: What you see on the screen isn't always what you get on the page.

Software vendors and Apple have gone to great lengths to address these conversion issues, but there are still times when things don't print the way they appear on-screen, so you end up with unusable printouts. When that happens, the user's typical solution is to start dismantling the file to see which component caused the problem. Was it that gradient? Or that included EPS image? Or perhaps this screen font doesn't match the printer font (even though they have the same name).

What could help prevent this media and time waste and give us a more WYSIWYG environment? Reducing the conversion steps between the WYS and the WYG, for one. What if the Mac's native graphics format were the same as the format used by printers? That's the promise of Display PostScript.

ILLUSTRATION / STU SUCHIT

Display's Da Thing

Display PostScript is the graphics language inside NeXT's OS. Today on the Mac, whenever an application wants to draw a line, paint a pixel, or type a character, it calls on QuickDraw, the imaging model built into the Mac OS since Day 1. On a NeXT machine, that same application would call Display PostScript. The same graphics would appear on-screen, but the guts of the program would be different. And (more important) the application wouldn't have to change anything when it came time to send the output to a PostScript printer instead of to the screen.

What a concept! We would finally have true, not just simulated, WYSIWYG. If something looked right on the screen, you could be pretty darn sure that it would print right as well.

Years ago, various people urged Apple to license Display PostScript from Adobe and use it as its imaging model. For several technical and economic reasons, Apple decided not to do this back then. But now things are different: The CPU, the OS, and the market have evolved to a point where perhaps PostScript on the screen makes sense.

There's quite a lot of ground to cover between saying this and making it a reality, though. Display PostScript is somewhat of a moribund, orphaned product; no one except NeXT and Sun (which made its own version) ever really used it. So who knows what shape the code is in, compared to more-recent Adobe efforts such as Acrobat and similar imaging models in Illustrator and other PostScript-based applications.

To complicate matters, there's the QuickDraw GX camp. QuickDraw GX, an advanced-technology version of QuickDraw, has lots of cool features but has never really caught on in the application community. And there are no high-end output devices (such as imagesetters) that support native QuickDraw GX files — this despite Apple's best efforts at evangelizing it in the developer community. But QuickDraw GX still might be better than Display PostScript, if only because it's a more modern incarnation of what an imaging model should be.

The other counterargument is that users outside the graphic-arts fields (the owners of all those Performas, for example) don't really need PostScript and shouldn't have to pay a premium for a printer with a PostScript interpreter, just because the internal imaging model is PostScript. Of course, the Display PostScript interpreter could send pixels only out to the printer instead of to the screen, but would that method be fast enough on low-end systems?

As users and writers (and users of writing too!), we don't have to make any of the hard decisions that Apple does about how to do any of this. All we would ask is that, as the NeXT Mac approaches, we be given a robust, well-supported, high-performance graphical environment that will help keep the Mac the premier platform for the graphic arts. What do you think of Display PostScript? What's on your wish list of features? Send us an e-mail at experttips@macuser.com.

Bob Schaffel is emerging-technologies consultant for R. R. Donnelley & Sons. Chuck Weger is a graphic-arts consultant and a partner in Genex Media, a company specializing in new media and Web design. Write to them at experttips@macuser.com.

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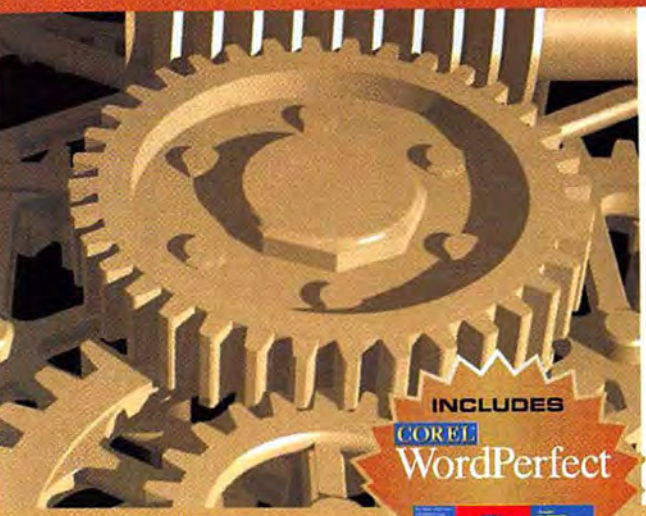

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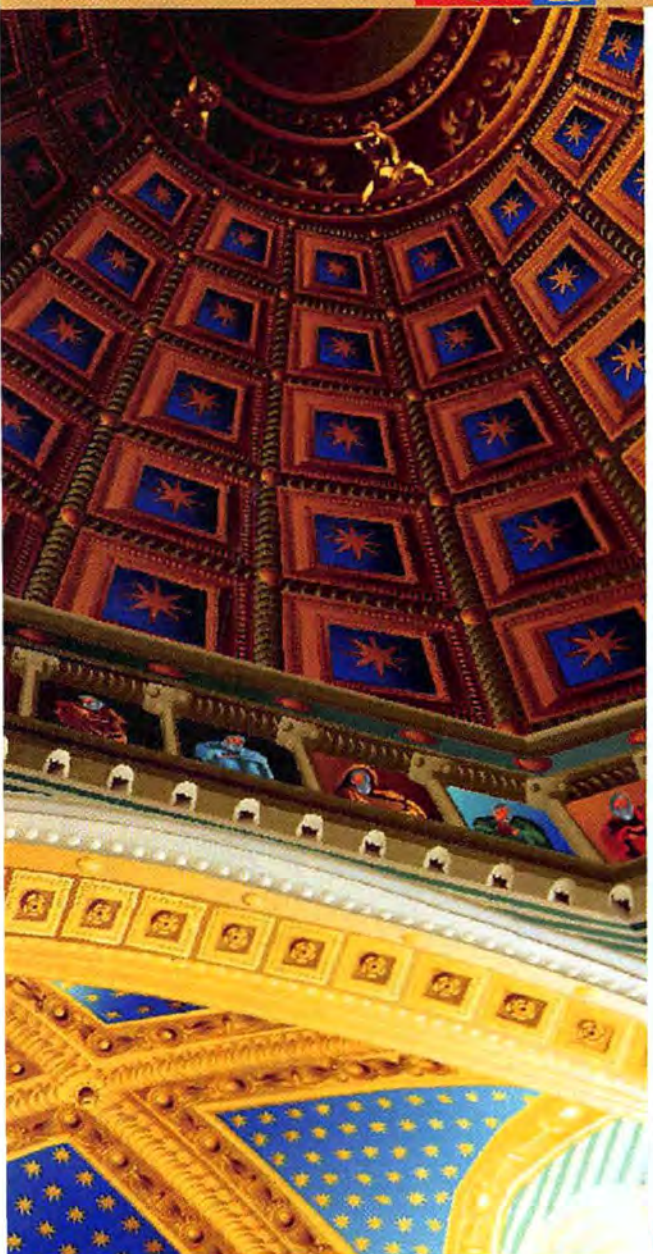

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CIRCLE **77** ON READER SERVICE CARD

Making sure everyone in your company has the latest software is a whole lot easier when you have a little help from your network.

By John Rizzo

Software by LAN

KEEPING UP WITH THE JONESES — or with the latest versions of software, from operating systems to word processors to spreadsheets — gets more difficult all the time. Software vendors release larger, more frequent updates each year, and network administrators must contend with the complexities of installing applications, control panels, and other files on each machine they manage. Whether you're the system administrator in your office or just happen to take care of the Macs in your spare time, you don't have to wear out your shoes to keep everyone's Mac current — you can use software-distribution applications to install new or updated software, right from the comfort of your own Macintosh.

There are two basic ways to install software on a group of computers: the sneakernet way and the automated way. Although using sneakernet is a great way to get acquainted with everyone in the office as you install a new application from floppies or a CD-ROM, it isn't very efficient: You waste your officemates' work time as well as your own. For most networks of more than three or four Macs, the automated way makes the most sense. Using the network and a software-distribution tool, you can keep everyone's applications up to date and yourself organized. Here is your guide to choosing and using a software-distribution application.

Programs that automate software distribution all do pretty much the same thing: They create and deliver software *packages* to Mac OS systems via the network. Packages consist of applications, support files, and system items — anything you want to distribute to a group of users all at once. After the package is delivered, the software-distribution tool puts applications, control panels, fonts, and other files in their proper places and trades old files for new ones. Some software-distribution tools even allow you to keep track of how many users are running a particular application and allow you to change users' control-panel settings to ensure compatibility.

Tools of the Trade

We took a look at three software-distribution programs: LAN Commander, from Power On Software; FileWave, from Wave Research; and NetOctopus, from DataWatch. Although each application has a different approach to the task at hand, their basic functions are the same. Each program includes an administration application (used by the network manager to create and distribute software updates) and a control panel that must be installed on each Mac OS system you intend to update remotely. The administration application communicates with remote users' Macs through the control panels and uses the client software to gather information about the users' computer and software.

Differences among software-distribution tools start to become evident when you examine how intelligently they distribute files and applications and how much work and time they save an administrator. The tool you choose should be the one that best matches both the size of your network and the amount and complexity of software you intend to distribute. Fortunately, several choices are available, ranging from a basic tool that essentially replaces outdated files and folders on the remote user's Macintosh to sophisticated offerings that can manage complex tasks such as system-software installation and application updates based on the contents of a user's machine.

On the low end, LAN Commander is inexpensive and very easy for novice software distributors to use. At the opposite end of the

ILLUSTRATION / VictoR GAD

spectrum is FileWave Enterprise Edition, which can support several thousand Macs, using multiple FileWave distribution servers. (The company also offers a Workgroup Edition of FileWave, which is included with Apple's Workgroup Servers.) The whole system can be administered from a single Mac. Between LAN Commander and FileWave, in terms of complexity and power, is NetOctopus. It can support several hundred Mac OS systems and is the only distribution tool that supports PCs as well as Macs.

Plan of Action

Regardless of the automation tool you decide to go with, planning for efficient software distribution is essential. Software installations are complex, and so is the task of updating all the Macs in your office. You need to decide what to distribute, when to do it, and how much control you wish to exercise over your coworkers' computers. Some choices will be determined by the tool you buy, whereas others will depend on an analysis of your network and need for information.

One of the most notable distinctions among the three current Mac software-distribution tools is the sophistication with which they can install complex software packages on users' machines. Installing system software, and many business applications, requires copying files to several folders on the target hard disk and replacing the outdated files. Software-distribution tools can do this, to varying degrees. NetOctopus, for example, can completely automate software updates by running an application's installer program over the network. It can also deposit installer packages in a folder on each user's hard disk. You can then instruct the users to run the installer at their convenience. A utility called File Scripter allows you to create your own AppleScript-based installation sequences. You can create scripts to install a customized set of software or to deliver company documents to everyone on the network.

Of the three programs, FileWave has the most sophisticated approach to custom software distribution and is ideal for organizations in which each Macintosh contains the same, company-approved software. With FileWave's FileSet Magic utility, you can scan a hard disk connected to your Macintosh and use the result to produce a standard configuration for each user on the network. You can add to this configuration by installing a copy of new or updated software. FileSet Magic then creates a package you can use to update everyone's Macintosh from the FileWave server. Updates happen automatically, according to the schedule you've set. FileWave also comes with precreated file-set templates for popular software, including ClarisWorks and Microsoft Excel 5 and Word 6.

For those who have only a few networked Macs to update and don't plan to perform frequent, complex distributions, LAN Commander is a simple-to-use alternative to NetOctopus and FileWave. LAN Commander can't use installer scripts to perform complex installs, but its straightforward approach makes it a good choice for part-time administrators who have simple needs. You can, for example, use a single menu command to install a single folder containing new or updated software. FileWave and NetOctopus require a bit more work.

Consider the Users

Delivering software over networks is a productivity boon to network administrators, but it has the potential to interrupt your colleagues' workday if not done carefully. Copying large files, even when it's done in the background, can slow the target Mac to a crawl. It's best to distribute software when users aren't working at their desks. NetOctopus lets you schedule installations and can therefore copy files at night or over the weekend, as long as the target Mac is turned on. LAN Commander has no scheduling feature and, since it is the most intrusive of the three packages, works best at lunchtime or at the end of a workday. You can set LAN Commander to lock a user's screen and keyboard during installation. This speeds up the file transfer but also makes the target Mac completely unusable. It's best to start distribution when your users leave and let LAN Commander run while you're gone.

FileWave provides the most sophisticated approach to scheduled installation. If you schedule a FileWave update, each Mac's client software will detect whether or not the Mac is in use, transferring files to the user's hard disk only when the Mac is idle. FileWave temporarily discontinues installation if the user presses a key, clicks the mouse, or shuts down the Mac. FileWave resumes copying where it left off when it senses that the Mac is running and idle again. This feature makes using FileWave a great way to update PowerBooks as they appear on the network.

Control Freaks

The ability to add software to remote computers gives network administrators a lot of control over Macs on the network. Besides the ability to tie up everyone's machine while software is updated, administrators have the power to wreak havoc with System Folders and application configurations. It's very important to thoroughly understand the capabilities of your software-distribution tool and

RATING SOFTWARE-DISTRIBUTION TOOLS

FileWave 2.6
$4.5

PRICE: Workgroup Edition: 10-user pack, $495; 50-user pack, $1,995. Enterprise Edition: Price based on the volume of licenses purchased. Installation and training costs included.

PROS: Effectively automates large, complex software installations. Installs only when Mac is idle. Advanced scheduling. Supports thousands of Macs.

CONS: Requires separate Macs for server and administrator. Server setup is complex.

Wave Research
888-345-3928 or 510-704-3900
http://www.waveresearch.com/

LAN Commander 1.02
$3

PRICE: $29.99 to $49.90 per user.

PROS: Simple interface. Inexpensive.

CONS: No scheduling. Lacks sophisticated conditional-installation features.

Power On Software
800-344-9160 or 330-735-3116
http://www.poweronsw.com/

NetOctopus
$4

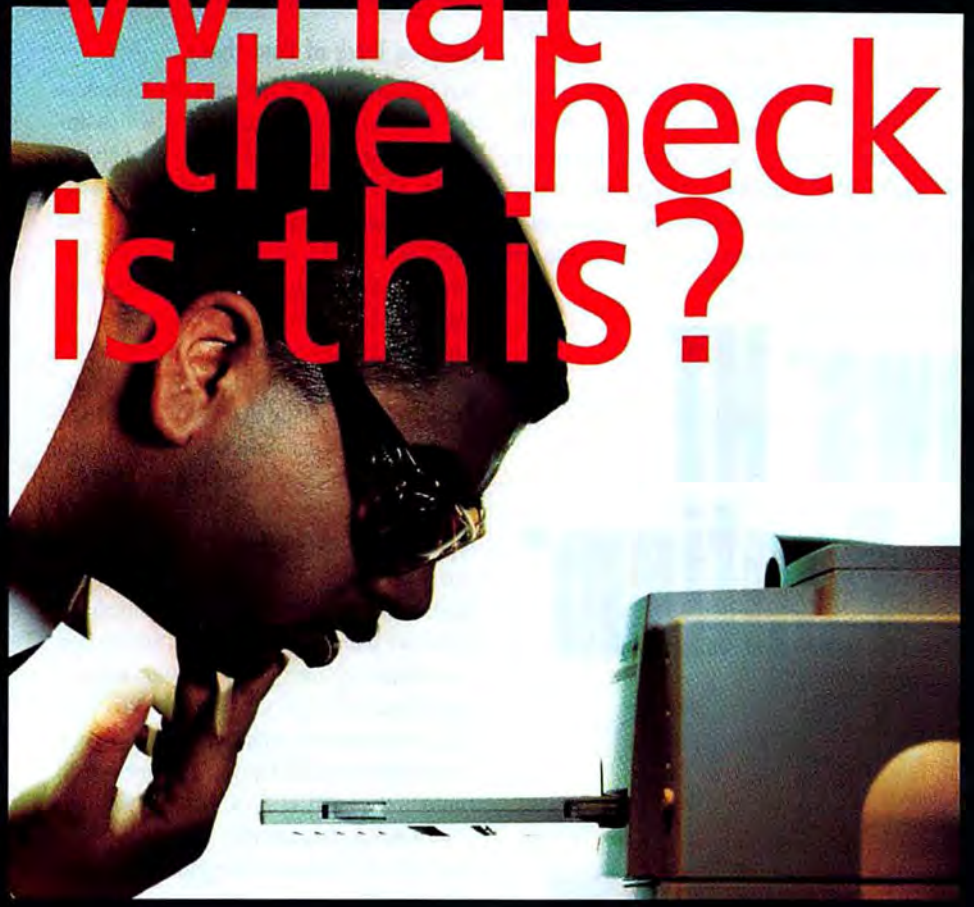
PRICE: $20 to $60 per user.

PROS: Good configuration and reporting abilities. Works with installer applications. Supports PCs.

CONS: Setup of complex software packages is tedious.

DataWatch
800-847-3982 or 508-988-9700
http://www.datawatch.com/

What the heck is this?



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The complete picture.

CIRCLE **169** ON READER SERVICE CARD

the consequences of adding, removing, or updating files on users' hard disks.

The System Folder is the biggest minefield for would-be software distributors. Since the many generations of Macs require different combinations of extensions and control panels, it's possible to cause conflicts and errors by installing the wrong software inadvertently. An administrator using LAN Commander carelessly can, for example, replace a user's System Folder — and any control panels, fonts, and preference files the user may have installed — with a copy of the System Folder on the administrator's Mac. If your network includes both PowerPC- and 680x0-based Macs, you'll also need to make sure the source Mac contains fat-binary versions of system software and applications you want to install.

With FileWave, you can create different System Folder file sets for different kinds of Mac OS systems. However, a few applications, such as Apple Remote Access, make changes to the System file itself. Because FileWave doesn't run the installer scripts, you'll have to replace the user's System file with the altered one.

Keeping Track of Your Users

You can't efficiently distribute software unless you have some understanding of which applications and System Folder files need updating. It's also helpful to know configuration details, including the amount of disk space and RAM each system on the network includes. Software-distribution tools gather this information, using the control panels installed on each Mac. You can even locate and modify system settings to accommodate new software. For instance, learning that Modern Memory Manager is turned off might explain problems with launching a certain application.

LAN Commander has the simplest set of reporting and configuration capabilities. It can turn file sharing on and off, set the sound level, set monitor parameters, and launch applications remotely. FileWave and NetOctopus can report on dozens of configuration aspects, including software versions, TCP/IP addresses, expansion cards installed, and lists of control panels. NetOctopus even allows you to configure users' TCP/IP and MacTCP settings.

Monitoring has another important function: software-license management. Tracking both the software you install remotely and the applications already stored on users' hard disks can prevent your organization from exceeding the number of licensed copies on the network. If you find unlicensed software, you can use a software-distribution tool to remove it. NetOctopus and FileWave can provide reports identifying software on each Mac. NetOctopus can also tell you what installed software is not being used. FileWave also enables the administrator to copy-protect any file it installs, preventing users from duplicating software. LAN Commander's reporting is more basic: The Application Status window shows you which Macs are currently running which application.

Automate Your Life

It's safe to say that software packages won't become smaller or simpler anytime soon, and no automated system can completely replace a system administrator traveling from Mac to Mac. Fortunately, software-distribution tools can free an administrator's time for troubleshooting and other important tasks.

John Rizzo is a MacUser *contributing editor.*

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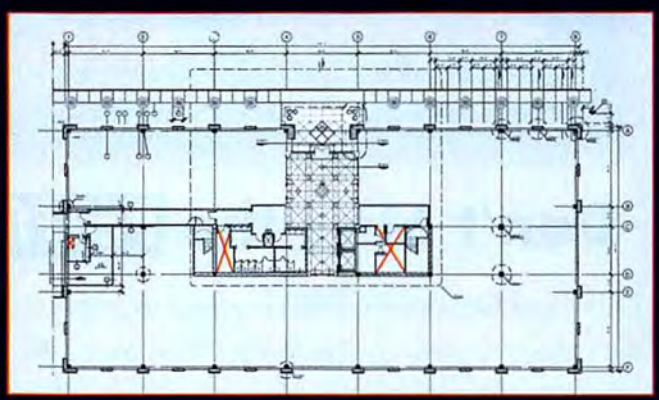

Way to Design

—Audience Vote at the Designers CAD Shoot-Out

The general-purpose MiniCad went toe-to-toe against industry-specific CAD programs nearly six times as expensive—and came out on top—at the first-ever Designers CAD Shoot-Out for Architectural CADD Systems. In this advent of "architecture as a spectator sport," the audience at Boston's World Trade Center awarded MiniCad 6, fittingly, six first-place awards:

- Most Cost Effective
- Easiest to Use
- Best at Cross-Platform Operation
- Best Floor Plans
- Best Elevations
- Best Sections

MiniCad also placed a close third in the Overall Winner category (garnering 21% of the audience vote compared to Arris' 25% and ArchiCad's 24%), beating out AutoArchitect, Microstation Triforma, AllPlan, Architrion, and DataCAD. Even more impressive: MiniCad was the only software program running on both a Macintosh and a Windows machine during the event. This recent success is not surprising. For years MiniCad has been the top-selling CAD program on the Macintosh, winning industry awards worldwide. And the reviews for the recently released Windows version have all been emphatic.

To find out more about the CAD Shoot-Out or how professionals in more than 80 countries have used MiniCad—designing everything from a guitar to a zero-gravity manufacturing device; building houses, luxury high rises, shopping centers, and hockey arenas; planning the stage set and lighting for worldwide Metallica tours; even helping reconstruct Shakespeare's historic Globe Theatre—check out our web page (www.diehlgraphsoft.com) or call 1-800-694-7318.

MiniCad has a suggested retail price of $795, and it comes with 18 months of free tech support and a 30-day money-back guarantee from participating dealers. MiniCad 6 supports Windows 95, NT, 3.1, and Macintosh OS.

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MiniCad 6—The only thing small is the price.

Java: Strange Brew

Can a caffeinated programming language save the Macintosh?

TALK TO ANYONE about the Internet, particularly a software vendor or a trend watcher, and that person will mention the growing importance of Java. Talk to Apple about its future operating-system strategy, and you'll hear that it's vital for Rhapsody, the company's planned NeXTstep-based OS, to be fully Java-enabled. Not that Apple will give you any specifics about it, of course, but whether it's in your Web browser or within the operating system itself, Java is coming to a Macintosh near you. The question is, Should you care?

A Cup of Java

If you've been so overwhelmed by the buzzwords that you've yet to hear a clear explanation of what Java is and why it's good for you, here's the digest definition: Java is a programming language created by Sun Microsystems that's similar to C and other languages used by computer programmers today. Unlike applications written in other languages, which must be painstakingly ported to each new platform, Java programs can run immediately on any computer that supports the Java language. Once Java support is enabled in a Web browser or application, or integrated into the Mac operating system, Java-based software written by a Windows programmer who has never even seen a Mac should run flawlessly on Macs.

At least, that's how it's supposed to work. However, the way a Java program runs on a computer depends on the quality of the *Java Virtual Machine,* the software that translates Java programs into a computer's native language. That's why Mac users have essentially been second-class citizens in terms of Java: Mac implementations of Java have lagged far behind those on Windows and UNIX systems, whether those implementations are on the Web or stand-alone Virtual Machines capable of supporting full-fledged applications. In the past, many Web-site owners have gone so far as to suggest that Mac users avoid their Java-based areas, because Mac Java just couldn't cut the mustard.

These days, the state of Mac Java is improving, and the language may soon emerge from the shadow of the Web. In January, Microsoft released its Internet Explorer 3.0 Web browser, with by far the fastest Java yet seen on the Mac — it uses something called a Just-In-Time compiler to make Java applets run . . . well, almost as fast as real applications! This new Java implementation is fast enough to finally make the Macintosh a full-fledged member of the Java family, not just some crazy uncle locked up in the root cellar and carted out for special occasions.

ILLUSTRATION / BARBARA POLLAK

I Prefer Cocoa

Me, I'm not even a coffee drinker — you won't find me spending all my time at the corner coffeehouse like half the characters on prime-time TV. But even a hot-chocolate type like me has to sit up and take notice when Ellen Hancock, Apple's chief technology officer, says: "Over time, more and more of the [Mac] system will be Java-based."

So why is Java so important? Right now, the applets Web authors are embedding in their pages aren't much to write home about — stuff such as animated stock tickers, news tickers, and sports tickers. Tickers proliferate because it's relatively easy to create them in Java. It's harder to write the kind of software that will make Java vital to everyone — full-blown productivity applications like those you and your Windows-loving colleagues use every day to get work done. When software developers are able to write a single Java-based version of an application, the old problem of deciding whether it's cost-effective to write software for the Mac as well as Windows machines will be a thing of the past.

Real Java-based applications are on the horizon: RandomNoise's Coda, written in Java, will let you create dynamic, interactive Web pages, all in a program that runs identically on Macs and PCs. Corel's forthcoming Corel Office for Java promises to bring platform independence to core business applications. Since Java will let Macs run applications they might never otherwise be able to run — such as most of Corel's suite — being a great platform for Java is a goal Apple should strive for. It could just save the company's bacon. After all, the inability to run a key piece of software is often cited as the reason to choose a Windows-based PC over a Mac.

Before you run out and sell your Intel stock in order to finance a humongous purchase of Apple shares, take heed. It's unlikely that Java alone will bring PC users to the Mac en masse. Java applications won't be able to take advantage of any unique Mac technologies, because that would prevent them from being platform-independent. Supporting Java will help Apple keep Mac owners happy and might prevent people from jumping ship to the PC world, but viewing Java as a magic bullet that will let Apple slay Microsoft isn't very realistic. Mac users may be out of the root cellar, but we're still going to have quite a fight to get a good seat at the dinner table.

Jason Snell is MacUser*'s senior editor, online. He can be reached at net.cetera@macuser.com.*

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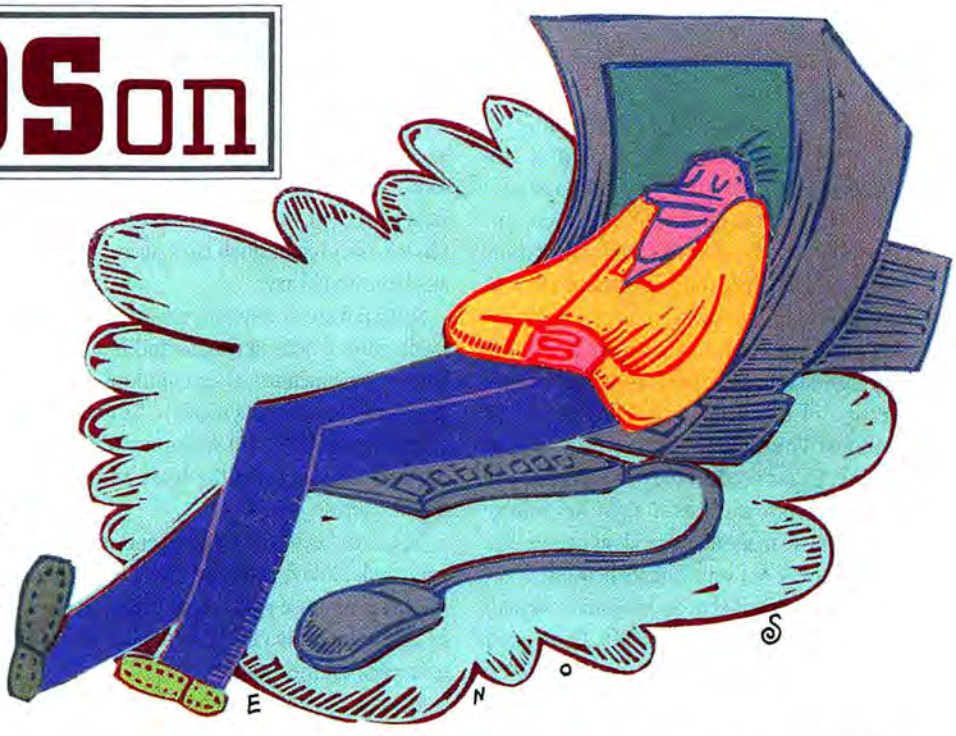
HANDSon



A head-to-toe guide for a comfortable fit with your Mac.

By Brooke C. Wheeler

The Ergonomic Mac

WORK IS A PAIN, YOU SAY? Try to squeeze your body into an ill-fitting workspace, and you'll start to mean that literally. Your body's fluid dynamics and subtle intolerances clash with rigid, poorly positioned office gear. Awkward keyboarding, a too-low chair, or a too-high monitor may seem like just a nuisance, but they're likely culprits in back and neck problems, headaches, eyestrain, and nerve and muscle damage.

Office ergonomics is an evolving science that's inspiring new products that prevent the strains caused by sitting in front of your computer — but, there is still no definitive solution for everyone. You'll have to try out products to see how they feel before you'll know if they'll really work for you. To get you started, here are some of the best products we've seen to help alleviate pains from head to toe.

From the Top: Head, Eyes, Neck

Eyestrain, neckaches, and headaches can be blamed largely on your monitor. The wrong monitor height or tilt strains your neck and eyes. The position that feels best is subjective, but you can start with the suggestion of many medical sources we surveyed — keep the top of the monitor at eye level. This creates a comfortable angle between your eyes and the monitor and helps keep your neck straight.

You can create your own makeshift monitor stand, but it may be easier to buy products ready-made to position your monitor. Stackable Steel Risers ($22 each), from Mead-Hatcher (see photo 1), let you raise your monitor in 2-inch increments and support up to 75 pounds. It's not hard to find stands that allow you to adjust tilt as well as height, but you should be prepared to pay more and expect more-difficult installation. For instance, Rubbermaid's Height Adjustable and Height Selectable Monitor Arms allow you to adjust monitor angle, but they cost between $50 and $250 and require either drilling or clamping for installation.

The position of your monitor shouldn't be your only source of concern. Glare from lights or windows reflected from your monitor can produce eyestrain, blurred vision, and headaches. Screen filters, such as Polaroid's CP-Series Glass Filters ($40 to $200), reduce glare and reflections and fit all monitor sizes. The less pricey ones hang from the top of your monitor, and the more expensive fit snugly over it. Cheaper mesh screens, such as Kensington's Mesh Antiglare Filters ($30 to $37), help reduce reflections but don't provide the sharpness of glass screens.

Spare yourself further neck pains and eyestrain by placing papers at an easy glance with document holders. If you find desktop stands hard to position effectively, try one that attaches to your monitor. You can find them in abundance at office-supply stores. If you want a deluxe stand, look for 3M's Standard Document Holder ($53). It adjusts to any angle, holds up to 150 papers on its bottom ledge, and folds away when not in use.

Off the Cuff: Arms, Wrists, Hands

If you yourself don't suffer from wrist or hand pains, chances are you know someone who does. Repetitive-stress injuries (RSI) are among the most common ailments of computer users. One method suggested in medical literature is to keep your wrist straight while typing and mousing. Since it's hard to hold your hand in that position all the time, you may need a device to do it for you.

Among the more unique wrist pads we've seen is Kensington's Contour Wrist Pad, for laptop keyboards ($29.95), desktop keyboards ($18.95), and mouse ($18.95). They're slightly inclined, have a funky curved shape, and come

ILLUSTRATION / RANDALL ENOS

in bright colors (see photo 2). Still they're not earth-shatteringly different from any other wrist pad out there.

If you want something truly different, even odd-looking, try out GBM Design's Comfortype ($150). It's a pair of sliding hand supports you rest your hands on while you type (see photo 3). You may feel they make typing more difficult, since you must carefully fit your hands into them. That can be especially annoying if you need to switch often between typing and mousing. You can also get a single version of this same wrist support — the Comfort Point ($25) — to attach to your mouse. Either product may be just what you need to keep your wrists straight. Regardless, you're sure to make new friends as people drift over to check out your bizarre new toy.

Great alternatives to deskbound wrist pads are MouseMitt Keyboarders ($19.95 per pair), little hand-mitts with cushions built into the wrist (see photo 4). They're comfortable enough to wear throughout the day. One pair of MouseMitts replaces numerous wrist rests, perfect for those who need a wrist rest for multiple keyboards or for a keyboard and a mouse.

Mice have gotten ergonomically revamped and now come in sleek designs and have programmable buttons to minimize extraneous pointing-and-clicking. But take care in your choice of mouse or trackball: Some can create troubles, especially if they work a weak part of the hand. We got thumb cramps, for instance, from using Logitech's TrackMan Marble ($100). Its trackball sits to one side of the unit, so you manipulate it with only your thumb. We had the easiest time with Kensington's four-button mouse — the Thinking Mouse ($105) — possibly because its shape lets your hand sit in a natural position even when you're moving it.

If you've tried every mouse and trackball you can get your hands on and still have hand pain, there is one more you may not have run into yet that has a unique design — the Contour Mouse ($90), from Contour Designs. It has an unusual shape with a bump in the middle that feels surprisingly comfortable when you rest your hand on it (see photo 5). It comes in five sizes for the right hand and two sizes for the left. Our only reservation was that this mouse, even in small sizes, seems unusually large and heavy.

Special mice and wrist supports won't do much good if your keyboard and mouse are at the wrong height. Current thinking among ergonomics specialists tends to be that your elbows should be bent at 90 degrees when typing and mousing, for the least amount of physical stress.

The best keyboard trays extend out from your desk and let you adjust height, tilt, and rotation. A mouse platform at the same level as the keyboard is vital: Don't make yourself overreach for the mouse.

Using a tray that pulls out from under the desk, such as Fellowes' Underdesk Articulating Keyboard Holder with Gliding Mouse Tray ($110) or Ring King's Ergonomic Keyboard Cradle ($90), is a good solution if your keyboard sits too high. Any tray will involve some clamping, drilling, or screwing to install, but you'll feel the difference.

Watch Your Back Side

Bad posture while you're working can snowball into other pains and problems, but proper posture sets the foundation for optimal comfort. Chairs can be a pricey addition to your workplace, but they can also make a significant difference.

Many people concentrate just on lumbar (lower back) support, but some back problems require support of the upper back (thoracic region) as well. If you suspect you need the full back treatment, you can turn to the tall-backed Executive Ergo Posture Chair ($750 to $1,100), from BackSaver Products. This chair comes with an adjustable back and optional headrest (for an additional $60). It has movable armrests that extend and swivel.

Another back supporter is the ZackBack Computer Posture Chair ($800 with adjustable armrests, $700 without), from ZackBack International. It has two separate supports for the lower thoracic and sacral (sublumbar) areas of your spine (see photo 6). The supports sit above and below the lumbar area, to support it indirectly, which you may find is more comfortable than direct support.

Strap-on back supports and chair cushions are a less expensive way to get ergonomic support, but choose carefully or you may create

PHOTOGRAPHY / LON CLARK

PRODUCTS FIT FOR YOU

1. You owe it to your eyes and neck to put your monitor at the right height. Products such as these **stackable steel risers** can help.

2. Wrist rests help ensure your wrist remains straight. The **Kensington Contour Wrist Pads** do it with a splash of color and an interesting shape.

3. Like an amusement-park ride for your hands, the **Comfortype** has sliding hand rests that may provide the funnest way to keep your wrists in the right position.

4. The wrist rest is built into these slip-on **MouseMitt Keyboarders** — they have a pad that goes under your wrist.

5. This could be the Birkenstock of computer mice. The **Contour Mouse** has a shape designed to mold to your hand and comes in five sizes for the right hand and two sizes for lefties.

6. Good chairs are pricey, but some people find they're the only cure for back problems. This **chair from ZackBack** supports the lumbar region without applying pressure to the area.

7. Full-back support, not just lower-back support, is what you get from this **tall cushion from 3M.** You'll need a tall chair to go with it.

DIRECTORY

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Executive Ergo Posture Chair

Contour Designs
800-466-6678 or 603-893-4556
http://www.contourdes.com/
Contour Mouse

Fellowes
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http://www.fellowes.com/
Computerware Premier Footrest
Underdesk Articulating Keyboard Holder

GBM Design
800-429-3746 or 310-305-8931
http://www.comfortpoint.com/
Comfort Point
Comfortype

Kensington Microware
800-535-4242 or 415-572-2700
http://www.kensington.com/
Contour Wrist Pads
Mesh Antiglare Filter
Thinking Mouse

Logitech
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http://www.logitech.com/
TrackMan Marble

Mead-Hatcher
800-225-5644 or 716-877-1185
http://www.meadhatcher.com/
Stackable Steel Risers

MouseMitt International
800-489-6488 or 408-335-9599
http://www.mousemitt.com/
MouseMitt Keyboarders

new problems. Little pillows that support only the small of your back may not be the right kind of support. Many back cushions concentrate on lumbar support, so look for a full-back model such as the larger Adjustable Back Support ($139), from 3M. Its nylon-covered molded foam covers more back area (see photo 7).

Footrests can also help rescue your aching back. They can reduce pressure on your lower back and thighs by elevating your feet and knees. Safco's lightweight Ergo-Comfort Adjustable Footrest ($39) tilts to support your feet, although only at a fixed height ($34 for 5 inches, $39 for 8 inches). A better option may be the Computerware Premier Footrest ($55), from Fellowes, which lets you adjust both angle and height.

The Best Fit

This is only a small sampling of all the ergonomic products available. To search for other products that will soothe you while you work and to stay up to date on the most-current ergonomic issues, get yourself online. The Typing Injury page (http://www.cs.princeton.edu/~dwallach/tifaq/general.html) has an extensive list of ergonomics Web-site links dealing with all kinds of office-related injuries. We also recommend visiting ErgoWeb (http://www.ergoweb.com/). It has a list of ergonomic products as well as current events and case studies.

Learning good work habits and investing in a comfortable work space are worth it in the long run. Seemingly minor pains can balloon into a real medical problem, with only a surgical solution. A comfy Mac space isn't a luxury — it's a necessity.

MacUser *assistant editor Brooke C. Wheeler also recommends singing show tunes at work to release tension and improve posture.*

Polaroid
800-343-5000 or 716-256-4436
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CP-Series Glass Filters

Ring King Visibles
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Ergonomic Keyboard Cradle

Rubbermaid
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http://www.rubbermaid.com/
Height Adjustable Monitor Arm
Height Selectable Monitor Arm

Safco
800-328-3020 or 612-536-6700
Ergo-Comfort Adjustable Footrest

3M
800-332-7483
http://www.mmm.com/ergonomics
Adjustable Back Support
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By Bob LeVitus and Christopher Breen

Help Folder

Talking to the Net, and how not to barbecue your Mac.

Browser, Can You Hear Me?

Q. I've got Speech Recognition running on my Power Mac. Is there any way I can use it to navigate the Web?

Sheldon Banebridge
via the Internet

CHRIS: In a limited fashion, yeah. Speech Recognition is still an infant technology and not terribly well supported, so you shouldn't expect to yak your way from hither to yon across the vast reaches of the Internet. Currently you can orally navigate within a few select sites, and to do so, you'll need some special tools.

BOB: Which we'll get to in a minute. Before we do, you should know that you can talk to your Mac until you're blue in the face but it won't do you much good unless you have a Quadra AV or Power Mac, a PlainTalk microphone, and Apple's Speech Recognition software installed. You'll know you're on the right track if you find Speech Manager and Speech Recognition in the Extensions folder and Speech in the Control Panels folder.

These are all parts of Apple's English Speech Recognition — the software that allows your Mac to understand spoken commands. The whopping 10-MB full version of PlainTalk 1.5 also includes English Text-to-Speech and Mexican Spanish Text-to-Speech. As you can probably guess, these text-to-speech utilities are for those times when you want the Mac to talk back.

CHRIS: As we scurried among the various online software depots looking for this stuff, we discovered that not all sites are completely up to date on speech software. If you want the most recent version of Speech Recognition — and believe me, you do — point your browser to http://www.speech.apple.com/.

Truth be told, earlier versions of such speech-hep games as IndyCar Racing II don't dig the lingo unless you're using version 1.5 of the Speech Recognition extension.

Now that we've laid the groundwork, can we give this poor guy the answer?

BOB: Sure, go ahead.

CHRIS: Currently you have two browser-plug-in options for prattling about the Web — Digital Dreams' ShockTalk (http://www.surftalk.com/SurfTalk/index.html) and Bill Noon's ListenUp (http://snow.cit.cornell.edu/noon/ListenUp.html). ShockTalk is an add-on to Macromedia's Shockwave plug-in that allows you to move around within a site by speaking the name of the site's links. Of course, that site has to be ShockTalk-savvy. Developers interested in making their sites ShockTalk-smart simply have to embed the 12K shocktalk.dcr movie in their Web page and add ten lines of HTML code. The movie file is included in the ShockTalk package.

ListenUp is even easier to use — no Shockwave plug-in necessary. You simply download either version 1.4.1 or 1.5a1 of the ListenUp plug-in (the ListenUp version you'll choose depends on whether you use Speech Recognition 1.4.1 or 1.5), toss it into the browser's Plug-ins folder, and you're off. Support for developers is likewise straightforward. You merely add a couple of lines of HTML to the Web page (you can find these lines at the ListenUp site), and your visitors will be able to talk the talk.

BOB: By the way, you can also use Speech Recognition with MT-NewsWatcher — a modified version of John Norstad's classic Internet newsreader. You will find MT-NewsWatcher at http://www.santafe.edu/~smfr/mtnw/mtnewswatcher.html.

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Tips / America Online 3.0

System Information

America Online 3.0 includes a very handy utility for people who want to know more about their Macs. Open the Online Tools Folder inside the America Online 3.0 folder, and double-click on the AOL Diagnostic application. This utility tests your modem and provides details regarding system, volume, and gestalt information.

Randy M. Zeitman
via AOL

Spelling Checker for the Masses

AOL 3.0's Spell Checking feature is a wonderful addition to the application, but gee, it's a shame to limit a perfectly good spelling checker to a single program — particularly if you don't have another program that includes spell checking. Here are the simple steps for using AOL 3.0 as a universal spelling checker:

In its native application, open the document you want to spell-check; select and copy the text; and open the AOL 3.0 application. Press Command-M to create a new mail message, and press Command-V to paste your text. Click on the Spelling button, and spell-check your text. When the spelling check is complete, select the text and cut it. Quit AOL without saving the mail message, switch back to the application you originally took the text from, and paste.

Tom Kennedy
via AOL

ILLUSTRATION / BOB STAAKE

Chicken-Fried Mac

Q. I know plugging a SCSI or ADB device into or unplugging it from a Mac while the Mac is on is a bad idea. Does this rule apply to the microphone and the speaker jacks too?

Grant McKercher
Calgary, AB, Canada

BOB (pulling out *Power Macintosh User's Guide*): Well, it says right here on page 38, "Follow these steps to connect the microphone. Step 1: Shut down the Macintosh." And page 39 warns you to turn off the Macintosh before connecting external stereo speakers.

I'd believe the book if I were you.

CHRIS: That was nice. Short but sweet. Perhaps a bit too short. So in a blatant ploy aimed at propping up our word count, I ask you this: Do you always — without fail — follow that advice, good doctor?

BOB: Hrumph. For nine years, I've been lucky. I've disconnected and reconnected more stuff to my Mac than Carter has little liver pills, only occasionally taking the time to shut down first. Although I publicly professed that it's never a good idea to plug *anything* into or unplug it from your Mac while it's running, I have often ignored my own advice. Until last week and the fateful morning my daughter's Mac froze.

It started up just fine and got all the way to the desktop, but the keyboard and mouse wouldn't work. I began by tracing cables. From mouse to keyboard, from keyboard to Mac. Then . . . there it was. The keyboard cable had come unplugged from the back of the Mac. Disregarding my own oft given advice, I casually reached around the back and reconnected the cable without bothering to shut down.

That turned out to be my big mistake. The Mac still refused to recognize the mouse or the keyboard, so I tried a different mouse and keyboard. That didn't help. A few hours later, I gave up and took the Mac to an authorized Apple dealer.

My number had finally come up. It turned out that my casual keyboard connection had blown the ADB chip on the Mac's logic board. And, since Apple dealers don't perform what they call "board level" repairs, the chip can't be replaced and I need a brand-new logic board, at a cost of almost $1,000!

CHRIS: Ouch. So? What are you going to do?

BOB: That's easy. I'm going to strip out the RAM and the hard drive — the only parts of the darn thing that are worth anything — and then use the remains of the machine for target practice.

A thousand bucks for a logic board? They have a lot of nerve . . . . And I have learned a valuable lesson: I'll *never, ever* connect or disconnect ANY device from my Mac without shutting down first.

And so, gentle reader, I implore you, do as I say, not as I did.

CHRIS: Bob's story touches me deeply, and his lesson is one you should take to heart: Better to play it safe than be left with a dead logic board.

However, I wouldn't feel as if I were earning my daily bread unless I dipped my oar in and mentioned the following:

1. According to Mac guru David Ramsey in the sixth edition of Peachpit Press' venerable *Macintosh Bible*, "hot swapping" ADB cables was a problem with the Mac II, IIx, and IIcx. It's not supposed to be a problem with modern Macs (although I'll be darned if I'll sacrifice my Mac in order to test it — and if you try it and your Mac blows up, send David your nasty letters, not me).
2. APS makes a little thingamajig called the SCSI PowerPlug that lets you hot-swap SCSI devices. The PowerPlug comes in two flavors — terminated ($99.95), for use at the end of the SCSI chain, and unterminated ($79.95), for use in the middle of the chain. Unless you have one of these devices, always power down your computer and SCSI devices before swapping SCSI cables.

BOB: Bold advice, but I still say the only safe swap is a cold swap.

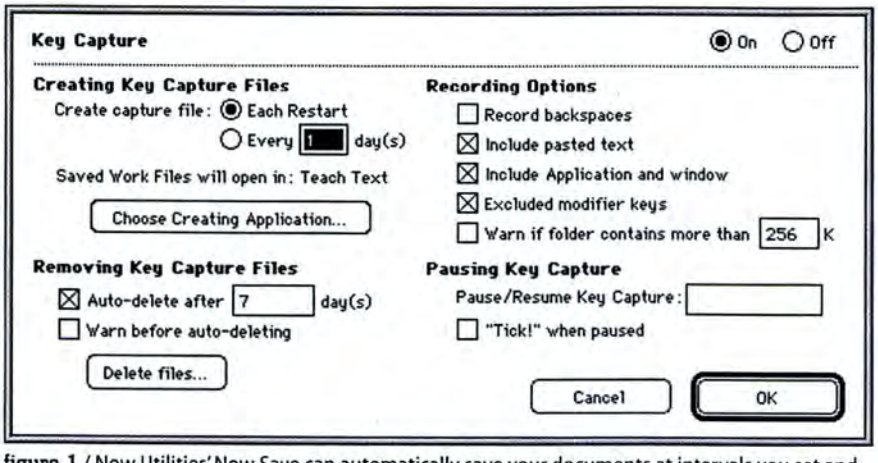

figure 1 / Now Utilities' Now Save can automatically save your documents at intervals you set and can capture your keystrokes to a text file.

Saved by the Mac

Q. One of my first word processors on the PC had an Automatic Save feature that could be set to save files at user-defined intervals. Is there any way to do this on the Mac?

Hermann Schmid
via AOL

CHRIS: Any way? *Any way!?* Hermann, baby (if I can call you baby), sweetie (see previous parenthetical thought), although we're a high-toned magazine and the sterner members of the Copy Edit department collectively crinkle their brows in a disapproving manner when we break into the vernacular, your question absolutely demands this response: "Well, *duh!*"

BOB: If I can step in for a moment — and save at least one loyal reader from canceling his subscription — I believe that Chris is saying there are several solutions to this problem.

CHRIS: No, I'm not. I'm saying "*duh!*" as in: *Duh!* Mac users have been able to perform this trick in a variety of ways since the days of the Plus and SEs. Your PC application could do it too? Whoop-dee-doo! Stop the darned presses, and hold me back — I'm gonna run Windows from this day forward!

BOB: You've been listening to talk radio again, haven't you?

CHRIS: Why I oughta . . . Wha . . . ? Oh. Well, maybe a little bit.

BOB: I thought so. Say you're sorry to the nice reader, and move on.

CHRIS: I'm sorry, Hermann, and to prove it, we'll provide you with several answers — each better than the last.

To begin with, most modern word processors allow you to autosave documents. I found this capability in all the word-processing programs on my shelf — Microsoft Word 6, Nisus Writer, and Corel's WordPerfect. These apps allow you to set the interval between saves. Nisus Writer even lets you space saves according to the number of keystrokes you type. Pretty keen.

BOB: Keen enough, but that feature helps only

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Tips / Netscape Navigator Gold

Go for the Navigator Gold

I have yet another method for off-line Web-page reading: Use Netscape Navigator Gold to suck a Web page down to your local hard disk for later reading. Here's how:

Select Edit Document from Navigator Gold's File menu (or click on the Edit button in the tool bar). Navigator will display a dialog box reading, "This document is on a remote server. You must save it locally before making changes." You'll also see "Save images with document" under the dialog box's Images heading. Be sure this option is checked. Click on Save, and choose a location to which to save your page. To later view the page, just use Navigator to open the document you saved.

A word of warning: Be aware that in Web pages that contain images, each image is a separate file. To avoid clutter, it's a good idea to create a discrete folder for each page you want to view.

Mike Higgins
via the Internet

if you're using one of those programs. If you process your words with an app, such as ClarisWorks or Microsoft Word 5, that doesn't have an autosave option, you'll have to look at more-global solutions.

One such solution is included in Now Utilities. It's called Now Save and automatically issues the Save command to any applications you choose. As in Nisus Writer, saving is based on time or keystrokes, and the utility can even save according to the number of times you've clicked the mouse. If you'd rather just be reminded to save, Now Save will nag you rather than save automatically. Also, Now Save has Key Capture (see figure 1), a function that saves all your keystrokes to a text file. This can be a real lifesaver if you've crashed without having saved.

CHRIS: A cheaper solution — although less thorough — is Scott Mitchell's Save-On-Time. This $15 shareware control panel does just about what you'd expect — it saves your files automatically at user-defined intervals.

Better than cheap is free, and if you already have a macro program such as QuicKeys, OneClick, or Tempo II, you've got your autosave solution in hand. All these utilities allow you to create macros that save your files whenever you please. OneClick — a utility I'm quickly becoming enamored of — even has a preconfigured autosave button that can be added to any application. Ultrakeen!

BOB: One last thing, Chris: My favorite spelling checker and thesaurus, Casady & Greene's SpellCatcher, includes perhaps the best implementation of keystroke saving, in its Ghostwriter feature. Although it can't automatically save your document, it does save every keystroke to a text file.

Disk-Cache Conundrum

Q. Let me start by saying I'm no newbie! So, I was wondering: What is Disk Cache in the Memory control panel? What does it do? Where should I set it, and why?

Daniel Holtz
Ithaca, NY

BOB: The disk cache is a portion of RAM set aside to hold recently used instructions. In theory, increasing it should make your Mac feel as if it's running faster. In reality, many people can't tell the difference.

CHRIS: The first important thing to know is that the memory used by the disk cache is added onto the RAM used by the system software. Therefore, memory assigned to the disk cache is not available for programs to use. So if your system software uses 6 MB of RAM with the disk cache set to its minimum setting (32K), it will use 7 MB of RAM if you set the disk cache to 1,024K.

BOB: The next thing to know is that the old rule of thumb about the disk cache — which says you should allow 32K per megabyte of installed RAM — is bunk. Many people can't detect a speed difference between a 32K disk cache and a 1,024K disk cache, so why should they waste a megabyte of perfectly good RAM on a speed increase they can't feel?

That said, I have to admit that the disk cache in Mac OS 7.6 feels a bit zippier than earlier disk caches. I notice a definite speedup with the disk cache set to 512K. Under old versions of System 7, the speedup didn't feel as great to me.

CHRIS: As Bob just said, some people don't notice the speed improvement provided by a larger disk cache. So the first thing you want to do is determine whether you can tell the difference. Here's how:

1. Open the Memory control panel.
2. Click on the Cache Size up-arrow key repeatedly until it reads 1,024 or higher.
3. Restart your Mac.

You now have a huge disk cache, larger than you would actually use in real life. But let's exaggerate its effects for the purposes of this experiment.

When your Mac has restarted, try this:

4. Open the System Folder, noticing how long it takes for the window to appear completely (stopwatch optional).
5. Close and then reopen the System Folder window, again noticing how long it takes to open the second time.

The difference in speed (the second time, the System Folder should have opened noticeably faster) is a result of the increased size of the disk cache.

You should also notice a speed improvement when you scroll through documents. So launch your favorite application, and try scrolling around within a document for a while.

BOB: If you don't notice any speed improvement in the Finder or in your favorite application, return to the Memory control panel, set the cache size to its lowest setting (32K), and be done with it.

If you notice (and like) the speed improvement, you still have a little more work to do. As you may remember, memory assigned to the disk cache is not available for applications. Consequently you want the disk-cache setting to be the lowest-possible number that still feels fast to you.

To lower the size of the disk cache, repeat the preceding steps, lowering the disk-cache number one or two clicks each time. Restart after each change. Then close and reopen the System Folder two times and note the difference in speed the second time. Next open a large document and scroll through it several times. When you begin to notice sluggishness when closing and opening or when scrolling through documents, then you've discovered your threshold. Go back to the Memory control panel, and increase the cache size by one click.

For what it's worth, I've got 32 MB of RAM and my cache is set at 512K for now. I may even decide to bump it up to 1,024K. That still leaves me plenty of RAM for applications, and I'm willing to trade a few hundred K of RAM for the speedup I feel. Your mileage may vary.

Bob LeVitus is the author of many computer books and the Mac columnist for the Houston Chronicle. *Christopher Breen is the author of* The Macintosh Bible Guide to Games, *published by Peachpit Press.*

You can find the shareware and freeware programs referenced in this article at *MacUser's* Software Central (http://www.zdnet.com/macuser/software/). You can also find them in the *MacUser* area on CompuServe (GO ZMC:MACUSER).

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4.3GB	Micrp.Tomahawk 4345	7.9ms	-	Ultra SCSI 3	875	935
4.5GB	Micrp.Tomahawk 4345AV	7.9ms	2MB CACHE -	F&W Ultra SCSI 3	975	1035
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4.3GB	Barracuda ST15150W	8ms	12.2 MB/Sec.	F&W SCSI 2	1095	1180

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2.5GB	Barracuda ST32171W	8ms	17.6 MB/Sec.	F&W Ultra SCSI 3	715	795
4.3GB	Barracuda LP ST34371N	7.9ms	-	Ultra SCSI 3	945	1005
4.3GB	Barracuda LP ST34371W	7.9ms	17.6 MB/Sec.	F&W Ultra SCSI 3	995	1080
4.5GB	Barracuda LP ST35401W	7.9ms	17.6 MB/Sec.	F&W Ultra SCSI 3	1395	1455
9.1GB	Barracuda 19171N	7.9ms	-	Ultra SCSI 3	1895	1855
9.1GB	Barracuda 19171W	7.9ms	18 MB/Sec.	F&W Ultra SCSI 3	1945	2030
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4.3GB	UltraStar 2 XP 34320	8.5ms	-	Ultra SCSI 3	925	985
4.3GB	UltraStar 2 XP Wide 34320	8.5ms	16.2 MB/Sec.	F&W Ultra SCSI 3	945	1030
9.1GB	UltraStar 2 XP 39100W	7.9ms	-	Ultra SCSI 3	1745	1805
9.1GB	UltraStar 2 XP Wide 39100W	7.9ms	15 MB/Sec.	F&W Ultra SCSI 3	1795	1880

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2.0GB	Atlas	8ms	-	Fast SCSI 2	495	565
2.0GB	Atlas	8ms	11.0 MB/Sec.	F&W SCSI 2	555	630
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GIGS	PRODUCT	MEDIA	TRANSFER/MIN.	INT.	EXT.
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4	Conner TravanQIC	QIC 80 M	20 MB	-	485
4-8	Hewlett Packard C1533 DAT DDS-2	DAT 120M	60MB	-	895
4-8	Sony 7000 DAT DDS-2	DAT 120M	90MB	-	989
24-48	HP1553 Auto Tape Loader	DAT 120M	60MB	-	2495
5-7	ExaByte 8505XL	8mm	60 MB	1995	2055
14	ExaByte 8700	8mm	60 MB	N/A	1475

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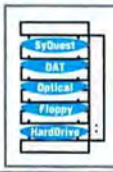

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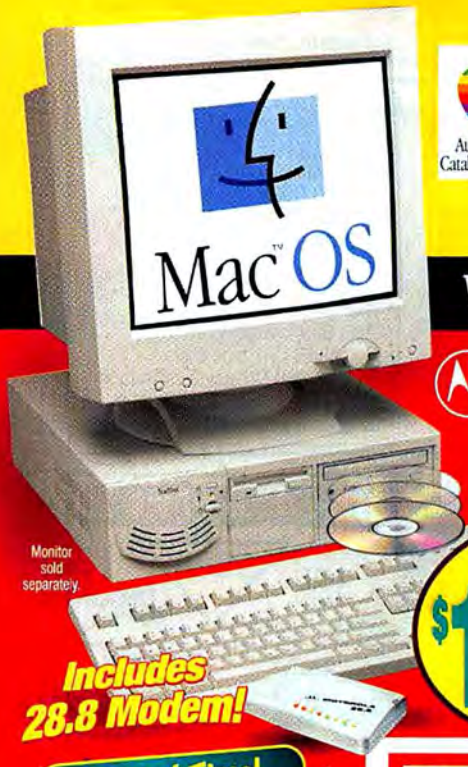

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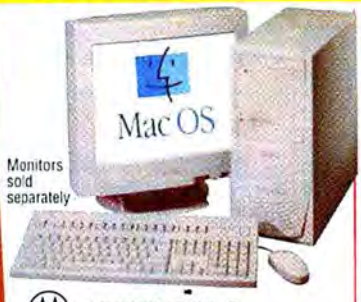

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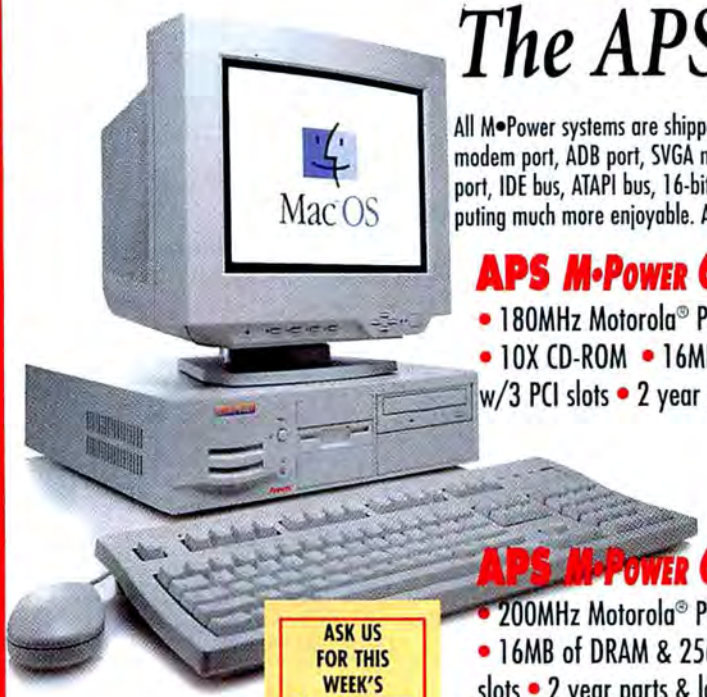

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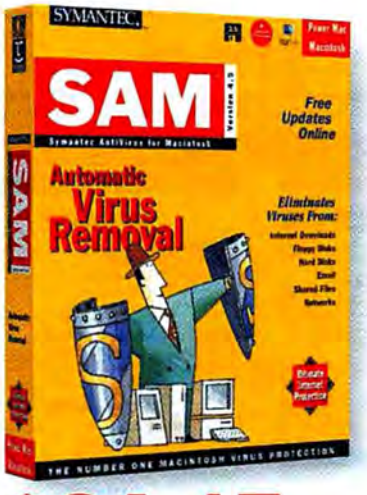

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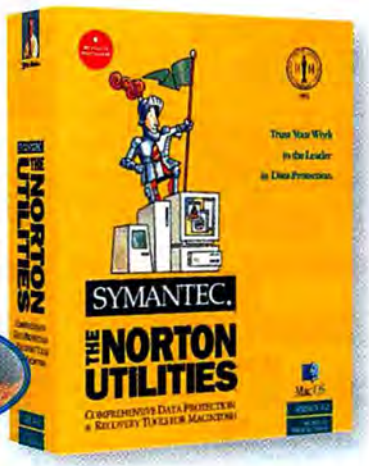

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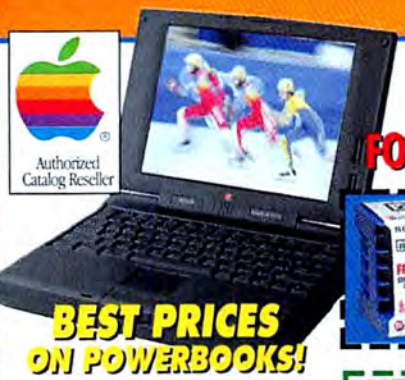

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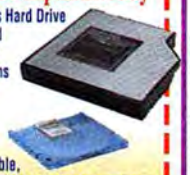

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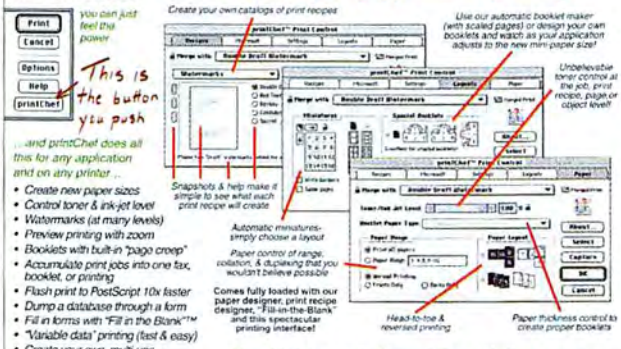

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Apple	LW 12/680PS/Color	5100
Epson	Stylus Color 500 720dpi	263
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Epson	Stylus Color 800 1440dpi	408
Epson	Stylus Color Pro XLWide	1685
HP	CopyJetM Color Copier	1625
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Epson	Express. 636 Artist	1228
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Microtek	Scanmaker E6	840
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One of the best coping mechanisms for expectant parents is to turn to a Mac.

By Teresa Lee Bojorquez

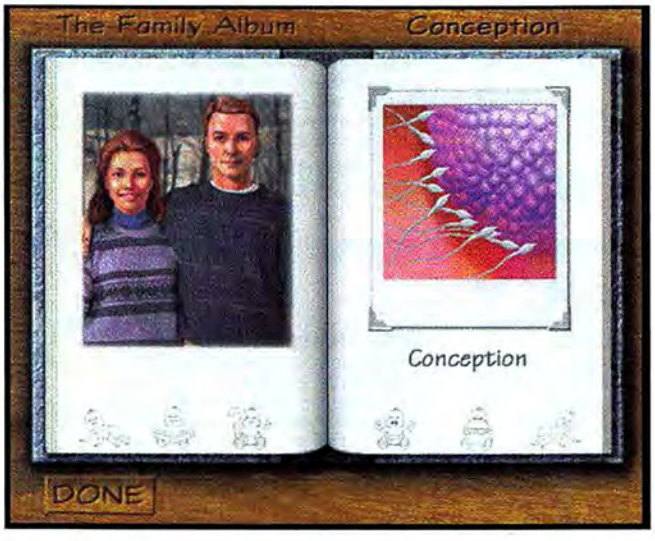
Special Deliveries

MY HUSBAND AND I refer to being pregnant as "the nine most confusing months of our lives." I'm already in the second trimester, and I still can't bear to look at certain foods without feeling nauseous. On the other hand, I crave unusual foods. Neither of us really understands it when I say, "Honey, I need cotton candy, and I need it now" (especially when I send him out twice in one evening).

We're helping each other through this exciting and stressful time, but we've both wondered at times about what to expect next and whether or not what we're experiencing is normal. My doctor gives some insight, but it's the information I've been able to get through my Mac that has put me the most at ease. There are lots of well-designed programs that explain what's going on during pregnancy as well as come to your aid after the baby's born. But be careful — there are also programs that are more a waste of your money than worth your while.

In Utero

The world's most famous Biblical pair, Adam and Eve, walk us through a multimedia experience from conception to birth in **Nine Month Miracle** ▼ (☠☠☠; $45 estimated street), from A.D.A.M. Software (800-408-2326 or 770-980-0888). This software uses storytelling to take you through the events of pregnancy. In the first chapter, you hear the story of how Adam and Eve discover that Eve is pregnant. The software also lets you view animations of what's happening inside the couple's bodies. For instance, animations in later chapters show you what an embryo looks like during various stages of development. You also get to see photographs of a real fetus, accompanied by a video of a doctor explaining in detail what you're looking at.

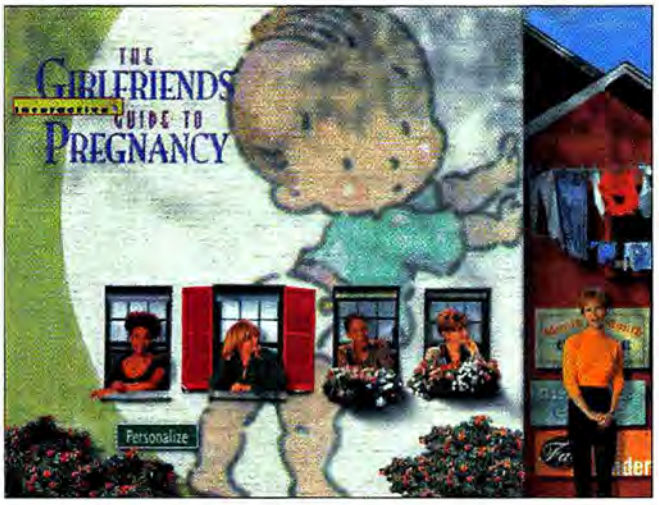


The Nine Month Video Club section of this software spotlights five real-life couples. You get to see videos of many of the events they experienced, including baby delivery and learning practical stretching exercises for pregnant women. If you can stomach it, you can choose to go past the red warning labels and watch an actual cesarean birth.

A nice touch is that the software caters to children as well as to adults. It has a separate story to help kids understand what having a baby is all about. And it has a lock-out feature for touchy subjects, such as Adam and Eve's sex life during pregnancy.

My biggest problem with this software is that it tends to drag. Videos load slowly, and actions as simple as turning the pages of its on-screen book take too much time, even on a Power Macintosh. The story itself is slow-moving. All too often, I felt as if I were taking a biology lesson rather than learning about what it's like to experience pregnancy.

ILLUSTRATION / DAVID RICCERI



For a more personal experience, you need ▲ **The Girlfriends' Interactive Guide to Pregnancy** (★★★★; $39.95 list), from Simon & Schuster Interactive (800-910-0099 or 970-339-7137) — my favorite of the software I looked at. It gives you the nitty-gritty lowdown that only good friends can provide. It's based on a book by Vicky Iovine and is full of "attitude" and humor. It has a fountain of pregnancy facts, a few games for both parents-to-be, a link to an online support group, and entertaining graphics throughout.

Instead of animations, it relies most heavily on videos of Vicky, the girlfriends, and some husbands offering advice. From health (Is it OK to eat mint-chocolate-chip ice cream at 2 A.M.?) to sex (What's the best position, being that 30 extra pounds is between us?), they let you in on their most intimate details. The software also comes with a customizable calendar for recording the events of your pregnancy.

The Girlfriends' Interactive Guide is just as thorough as Nine Month Miracle at exploring every stage of pregnancy but is more personal, entertaining, and speedy.

Another thorough pregnancy guide that focuses on personal experience is **Your Pregnancy, Your Newborn** ▶ (★★★★; $39.95 list), from *Parenting Magazine* (800-856-1351 or 212-840-4200). Instead of using attitude and humor to deliver its messages, it relies on soothing music, a beautiful interface, and an abundance of opinions. Everywhere you turn in this software, you see or hear an interview with new parents and birthing professionals. It's refreshing to hear such personal experiences as one of a woman who liked being fed ice cubes to kill pain during labor. It includes in-depth information on many other topics, such as fertilization, stress during pregnancy, communication with your doctor, breast-feeding, emotional changes for both mother and father, and sex after pregnancy.

You also get advice about your newborn's first three months — how your child develops and how to care for your new bundle of joy. If you're still hungering for insights from *Parenting,* you can use the software's direct online link to reach the magazine's Web site.

The most impressive part of this CD-ROM for me was its more than 600 breathtaking photos. The intimate portraits of fathers and new mothers (sometimes naked) with their babies were inspirational.

If you want current information now, rather than waiting to buy software, take a journey online. One of my favorite Web sites is **ParentsPlace.com** (http://www.parentsplace.com/). It offers information and support not only on pregnancy but also on raising children. There are live daily chats on various subjects, such as breast-feeding. It also has bulletin boards, a shopping mall (complete with baby clothes you can order), and articles from various contributors.

Life After Birth

Since the challenges don't stop after your baby is out of the womb, the help from your computer shouldn't stop either. Medical help is what I was looking for in A.D.A.M. Software's **Pediatric HouseCall** (★★½; $40 estimated street), for those many times when my wee one has bewildering aches and pains. What I found in this software was a ton of information that was difficult to decipher.

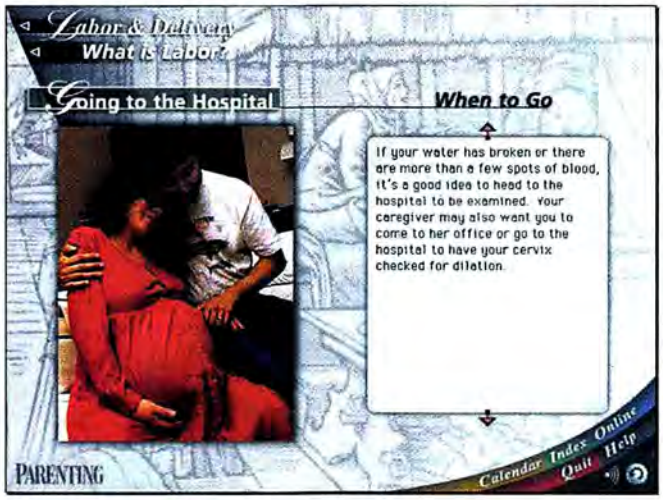
Part of the problem is a dull interface. You begin each diagnosis by choosing your child's symptoms from lists on text-only screens. Then the software gives you a list of likely ailments, such as vertigo or inner-ear infection. The descriptions of the ailments and what to do about them also make the software difficult to use — the descriptions are clinical and often so technical they're confusing. Does it really help to know, for instance, that an ailment is associated with "transient ischemic attacks"?

The software does, however, contain volumes of medical info. If you're willing to read lots of dry text, you're likely to get some useful advice.

With a bad taste in my mouth from medical software, I decided to give the Web a chance to restore my faith instead of giving up. Restore my faith, it did. That's because I found **KidsHealth.org** (http://kidsHealth.org/). It's devoted to the health of children and teens and is intended for parents as well as children. There's information on growth, food, fitness, childhood infections, immunizations, lab tests, medical and surgical conditions, and the latest treatments.

The Next Chapter

After reviewing all this information, I knew all I wanted to know for a while about being pregnant, giving birth, and treating childhood diseases. What I needed was something simple that would help prepare me for motherhood. I was looking for the kind of simplicity and comfort you can find in a belly button. So, I settled down with one more piece of software: ◀ **What Is a Bellybutton?** (★★★; $15 estimated street). It's a book on disk from IVI Publishing (800-432-1332 or 612-996-6000) that's narrated by a teddy bear named Baxter. Children can follow along with Baxter as he reads simple sentences on-screen, or they can explore this software's numerous "hot spots" (areas that become animated when you click on them). It'll come to your aid when your children are driving you crazy with questions about everything. It won't come close to answering all their questions, but it does tackle several questions that are the most frequently asked. And it answers them in a language they can understand. "Why can't fathers have babies?" the girl in the story asks. Because they don't have a place to store them. Life is simple for now.



Teresa Lee Bojorquez is a writer, actress, and mother of a six-year-old boy. She conceived her second child during the course of reviewing the software in this article. We make no guarantees, but using this software may work for you too.

The Game Room

BY ROMAN LOYOLA

I LIVE IN A FANTASY WORLD in the Game Room, and this month I'm dreaming of winning fabulous cash and prizes, investing that money in my own business, and then using my earnings to do what I've always wanted to do — create my own empire.

You Don't Know Jack Volume 2

Remember when Rolf Benirschke took over *Wheel of Fortune?* He just didn't have that Pat Sajakian quality required for the show. Or how about when Ray Combs took the helm of *Family Feud?* God rest his soul — he simply wasn't as fun to watch as Richard Dawson.

A great game show can be simple or tough to play, but it has to have the right host. And the host is what made the original You Don't Know Jack a must-have. He was wisecracking; he had attitude; he was funny and energetic. In You Don't Know Jack Volume 2, the original host has been replaced, and it affects the whole game. The new host *sounds* like the old one, but at times he seems to be reading from a script and his sarcastic delivery lacks the sneer of the old host. Sometimes this new guy just plain isn't funny.

Regardless, the game is still great. As in the original version, one or more contestants compete to win points for ringing in first (by pressing a key on the keyboard) and correctly answering trivia questions. Volume 2 contains 800 new questions, ranging in topic from Humphrey Bogart films to the colors in the J. Crew catalog — enough to satisfy any pop-culture connoisseur. And although the questions in this version are a bit more risqué, they're never offensive. There are also entertaining guest appearances by the likes of Erik Estrada (see background art) and Florence Henderson.

If you liked the original, you'll like Volume 2, especially if you play the game with a group of friends. Based on content alone, Volume 2 is another must-have. Unfortunately, the new host will probably be remembered like Rolf, Ray, and the many others who, despite their best efforts, just couldn't fill the shoes of their great predecessors.

Capitalism

If you think you've got the savvy and smarts it takes to be the next Sam Walton (the *Wal* in *Walmart*), you might want to try your hand at the simulation game Capitalism (shown below) before taking the entrepreneurial plunge. Unlike most simulators, in which you control a society, Capitalism lets you run a business. And although succeeding at Capitalism may not actually be a true indicator of your business savvy, it will certainly give you a glimpse of the complexities of big business.

The game is no visual feast — it uses simple graphics and static photos — but it shines in its presentation of the complex aspects of running a business. You must keep track of such business units as purchasing and retail sales and control inventory by tracking product demand. You can promote your products to increase sales; you can even deal stock for your company. You do all of this through a dense but easy-to-learn interface. (The tutorial games also help you familiarize yourself with Capitalism's controls.)

CAPITALISM

One particularly welcome aspect of Capitalism is its competitive feel, a game-play component rarely seen in other simulations. Most sims, such as Sim City 2000 and AfterLife, are based on the forces of supply and demand. In Capitalism those same forces are at work, but you also face competition from other businesses. Those competitors not only sell some of the same products you do but they can also engage in price wars. And if your business's stock is attractive enough, you may even find yourself in the throes of a hostile takeover.

Capitalism is one of the best sim games to be released since SimCity 2000. If you're looking for a challenging, realistic simulator that offers hours of entertainment, Capitalism will suit you just fine.

Caesar II

With the sim game Caesar II (shown above), I can at last build an empire worthy of my name. That's because it's based on the ancient Roman empire. Your goal as governor is to build a Roman province and develop it into a prosperous society.

While playing Caesar II, you can't help but be reminded of SimCity 2000. The layout of the terrain is similar, with easy-to-view angles and buildings that bear some resemblance to those in SimCity — not a bad style to choose, since the structures are colorful and beautifully drawn. Caesar II has buttons that represent particular structures and resources your citizens need.

CAESAR II

You monitor your empire's progress through an area called The Forums, where you can quickly gauge such factors as workforce numbers, security levels, tax rate, population, and your own popularity. As in SimCity 2000, you receive advice about your policies and your empire's needs. There are also nice-looking animations to alert you of good news or disasters.

Among Caesar II's most outstanding features are its battle sequences, in which you must defend yourself against those who attempt to invade your empire. To engage your troops, you simply point and click. The battles provide a nice change of pace from your continuous empire monitoring.

Caesar II is so similar to SimCity 2000 that you could mistake it for the same game, with some different graphics thrown in and without the terrain editor. The experience is similar to watching *Die Hard 2* after already seeing *Die Hard* — it has the same basic elements but enough changes to make it feel like a new movie.

Thanks to the sim game Caesar II, MacUser Associate Editor Roman Loyola actually succeeded in building Rome in a day.

GAME POINT

You Don't Know Jack Volume 2 ★★★★

Price: $29 (estimated street).
Company: Berkeley Systems, Berkeley, CA; 800-713-7146 or 510-540-5535; http://www.berksys.com/.
Reader Service: Circle #423.

Capitalism ★★★★

Price: $45 (estimated street).
Company: Interactive Magic, Research Triangle Park, NC; 800-789-1534 or 919-461-0722; http://www.imagicgames.com/.
Reader Service: Circle #424.

Caesar II ★★★★

Price: $45 (estimated street).
Company: Sierra On-Line, Bellevue, WA; 800-757-7707 or 206-664-4343; http://www.sierra.com/.
Reader Service: Circle #425.

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ANDY IHNATKO

Point Counterpoint

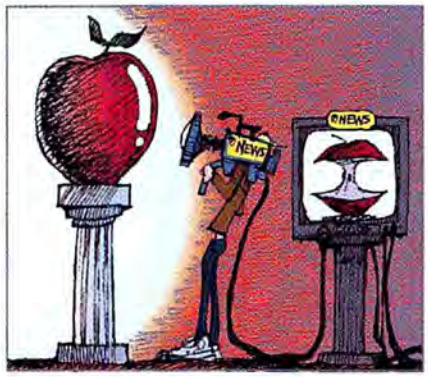
EXCEPT FOR THAT ONE GUY who ran out onto the field during the first quarter of this year's Super Bowl buck-naked, waving an enormous banner with the Mac OS logo on it and the legend "Just Wait till NeXT Year!", there is *no one* more committed to boosting The Cause of the Mac than I am. Nonetheless, there are those moments when I just have to make that two-mile hike through a nearby woods to a secluded lake, climb to the top of a rock, and shout, "It's entirely possible that Apple's future is significantly more bleak than I'm comfortable to admit!"

Factoring in all machines running the Mac OS, the Mac's market share actually increased during the last quarter. But the press has looked only at the market share of *Apple* Macs and thus is reporting a *decrease*.

Heidi Roizen, in the space of just one year as vice president of developer relations, made incredible strides toward mending the bridges between Apple and its community of developers. Instead of getting so fed up with Apple's closed-mouth policies and occasional undermining of their markets that they flee for more Microsoftish pastures, developers are staying put. But she's not here anymore. Ellen Hancock, vice president of advanced technology, has impressed almost all the folks I've talked to as a capable technology czar who nevertheless can communicate effectively. But she's been pushed aside in the most recent reorg.

Apple has plenty of groundbreaking technologies and Way Cool Stuff in the hangar and on schedule for impressive rollouts. The fastest desktop machines on this planet run the Mac OS. The Mac is well poised to be the first platform to fully exploit Digital Versatile Disc. If the new OS is truly as rich as promised, it'll be a technological pantsing for all competitors. And the Newton 2000! Its handwriting recognition is almost psychic, and voice recognition is rumored to be around the corner. Apple and the Mac OS are where all the cool stuff is happening.

So if Apple can master all this technology, why can't it understand the fundamentals of the press release? When it announced that NeXT would be blacksmithing the next Mac operating system, didn't it foresee that the worst possible answer to the inevitable question "Will this new OS run the Mac OS or even



look like it?" would have been "Haven't the foggiest. Sorry."? As Gil Amelio's big speech to the shareholders last February was being printed out, didn't it occur to anyone that it would be perhaps counterproductive to have the big guy hint that — just a month before releasing a breathtaking overhaul of the platform — the Newton division would be sold off?

And although Intel is making a lot of strides with the Pentium, the chip can still barely achieve half the performance of an equivalent PowerPC. But who cares? Well, I mean from the public's point of view. Intel's all over TV and the newspaper with ads touting the things you can do with Pentiums. We know it's like bragging that your car can roll forward *and* backward, but the Huddled Masses out there don't and the press doesn't seem to care.

The price of Apple stock is at an all-time low. But the low price means that no matter how skeptical you were last year about a takeover of Apple, the concept now demands serious thought. But unless the buyer were Apple itself — technically possible, given its latest financials — a buyout, to be blunt, would suck for all concerned.

What cameras from Nikon are to creating photos, Macs are to creating Web sites. We've got the most-secure servers available and the most-popular site- and content-development tools, and more of the Web's standards belong to Apple than to any other single entity. But so what? CNN will still be reporting that a shortage of ADB cables in Micronesia Is Yet Another Blow for Struggling, Troubled Apple Computer. It's just that it'll look and sound *really* cool when posted on the CNN Web site.

The "1984" commercial, like the smash musical *Cats*, is forever. But man, why didn't *Apple* think of using Johnny Cash's "Ring of Fire" as the soundtrack of an ad promoting its game infrastructure? Kudos to Microsoft.

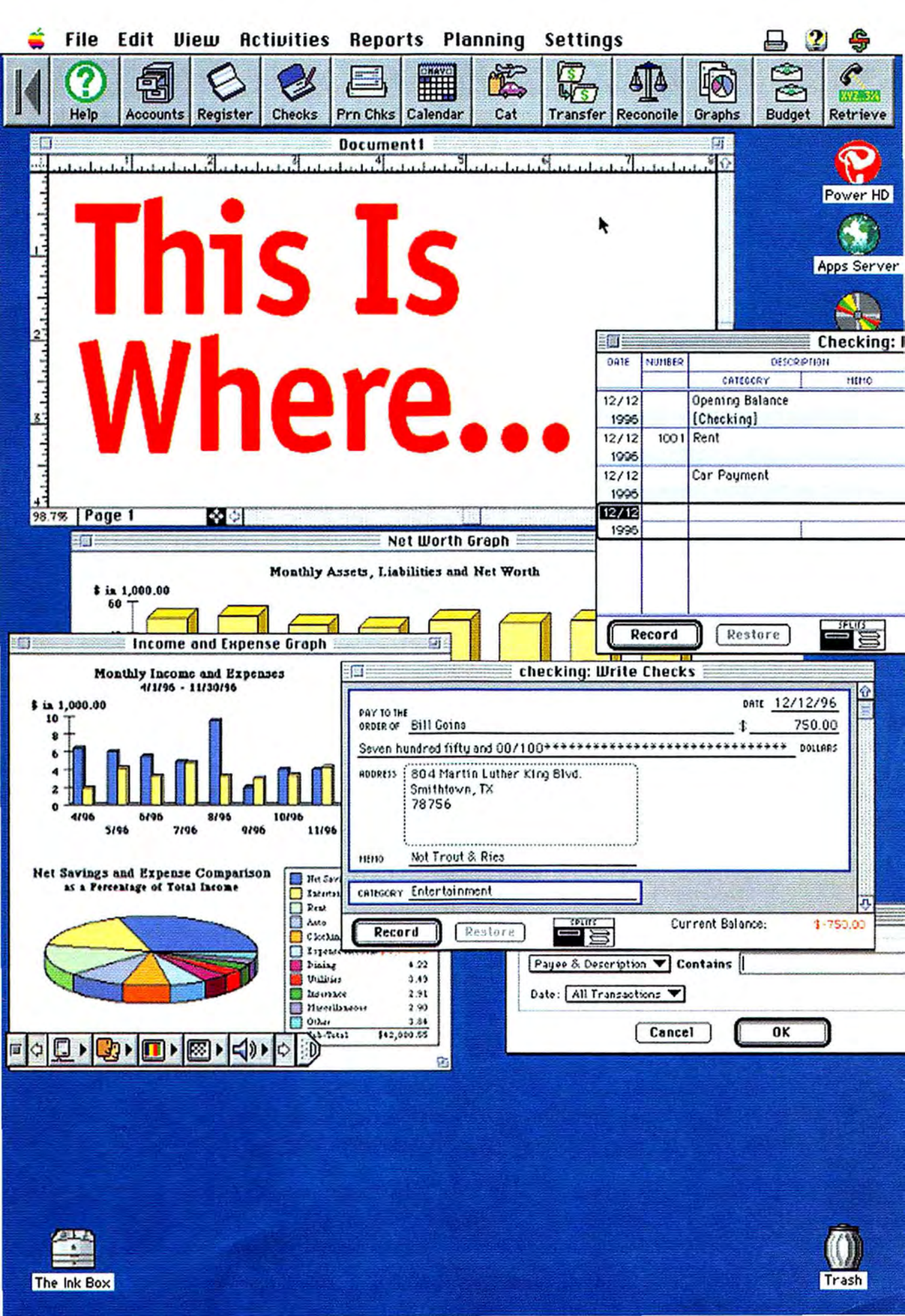
Microsoft is eagerly and genuinely developing for the Mac, revamping the division and making sincere-ish announcements about its dedication to the platform. But its Mac products still look like Windows products, which is to say that at best they look like Mac products on an extremely bad hair day. And Microsoft Office has largely killed off all competing Mac word processors and almost completely killed off the rest of the spreadsheet market. You know how Microsoft could really hurt Apple? Terminate Office for Macintosh. Apple would lose a good deal of its entrée into Windows offices *and* two of its most important business products.

The Mac was crucial in the development of the digital effects for *Star Wars: the Special Editions*. Well, here there's absolutely no counterpoint to be made. The Force will be with us. Always.

"It is a dark time for the Rebellion" is usually my final thought as I climb down from the rock and take one last look around to make sure I wasn't observed. But I know in my heart of hearts that Apple will survive, that any thoughts of its demise are wholly premature.

"We Shall Prevail," I think as I traipse back through the woods. Then I remember that these were the last words of Big Brother before the lady in the Macintosh tank top nailed him with the sledgehammer.

ILLUSTRATION / STEPHEN FOSTER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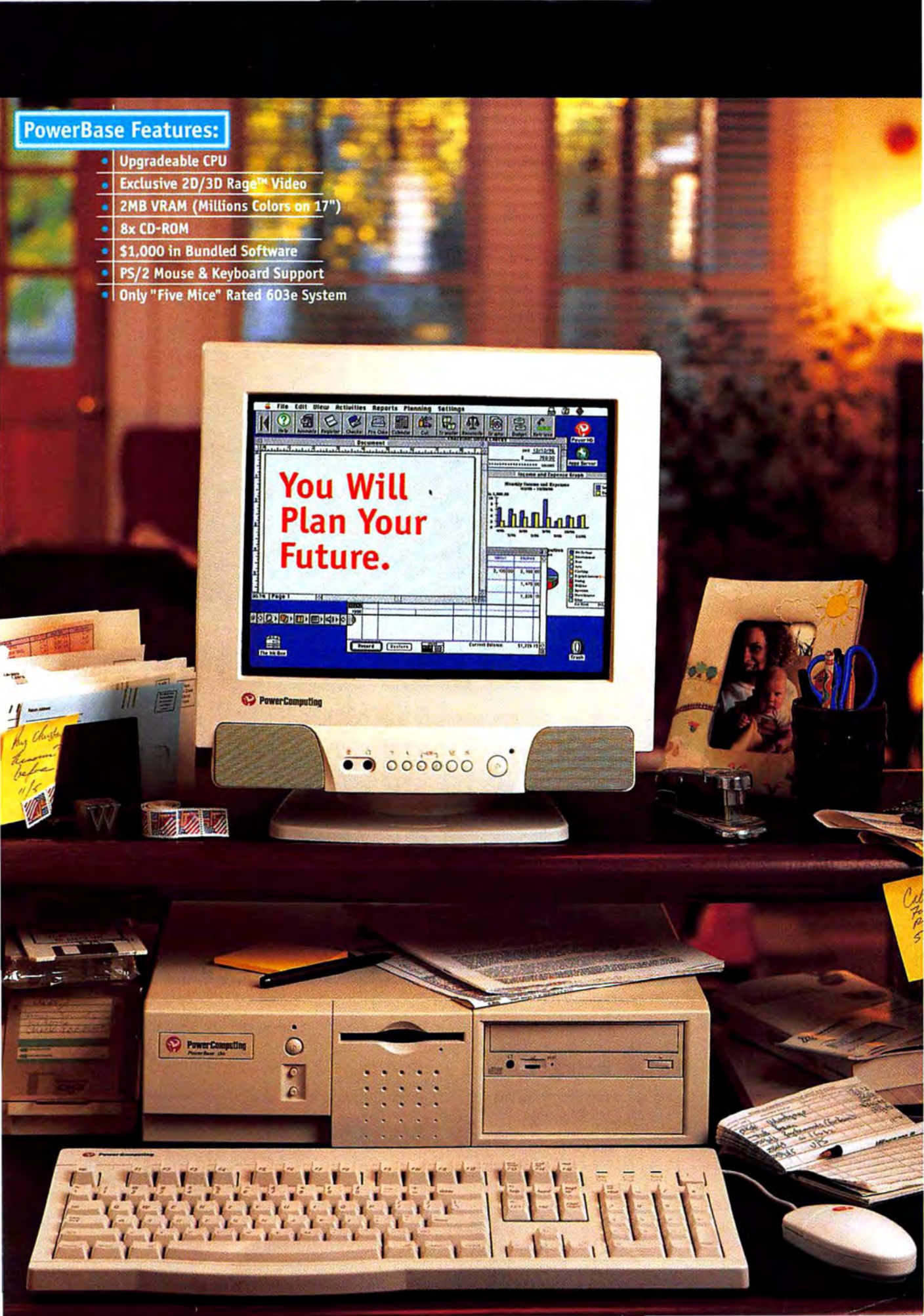
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