

The Hardware Helper II



Our expert suggests two Web computers: one for text, one for multimedia.

In the November issue, I wrote about choosing the best standalone computer to use with multimedia CD-ROMs ("The Hardware Helper: Taking the Guesswork out of Multimedia Systems," pp. 30-33). Many of the same criteria apply in selecting a computer for Web applications. But in my opinion, there are enough differences to justify a separate computer with its configuration optimized for searching the Web.

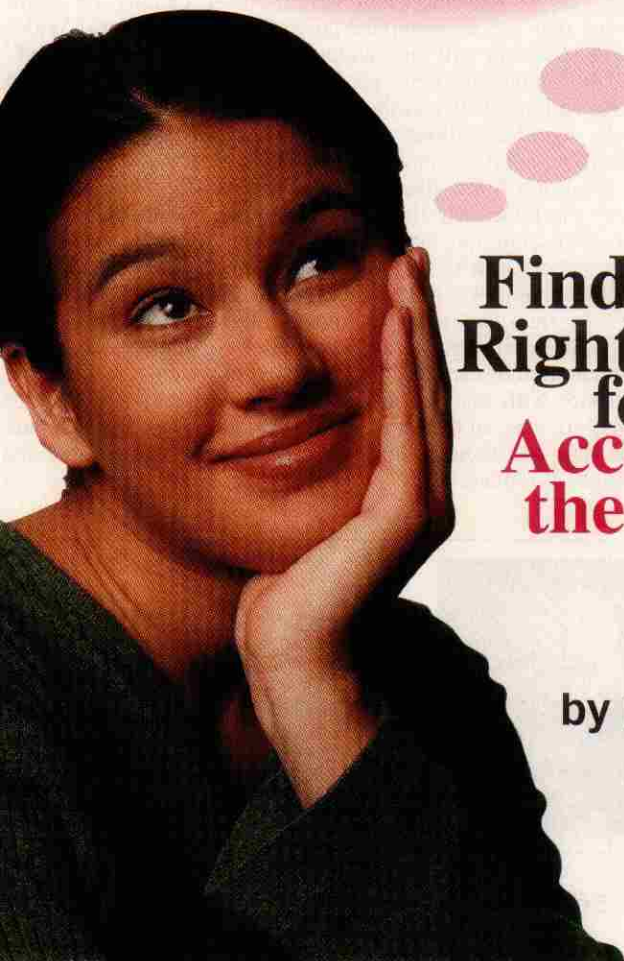
Of course, Web applications can range from using text-oriented sites with a few images thrown in to surfing the hippest sites with all the cool multimedia features—Macromedia animations, MPG movie clips, or RealAudio streamed music. At home you're likely to use the same computer for all Internet applications, but in a school setting, I recommend catering to these different needs by using computers with different capabilities.

The advantages of the Web's graphical nature are obvious to anyone who's tried to access a Web site using both the non-graphical Lynx browser and one of the graphical kinds—Netscape Navigator, Microsoft's Internet Explorer, Spy, or Global Navigator Network. The difference is akin to cruising an unknown neighborhood on a foggy, rainy day, looking for an address without a map, versus driving around with a global positioning system built into your dashboard.

A graphical connection obviously requires a more powerful computer, but the real strain arises in playing back the Web's increasingly popular multimedia elements. Here your connection must not only be graphical but as fast as pos-

Finding the Right System for Accessing the Web

by Péter Jacsó



ble. While a dial-up connection of 9.6 Kbps makes waiting for the appearance of maps or photos about as much fun as watching paint dry, it renders dynamic multimedia like audio, animation, or video utterly useless, breaking down the flow of information into tiny segments. (Imagine reading this article letter by letter!)

Yet it's a waste of resources to use a well-endowed multimedia PC merely for e-mail or searching text-oriented Web sites and directories. I've been using computers with widely differing configurations for accessing the Web, and believe the smartest solution for a school library is to have both a budget and a power PC for Web access. True, students would tend to use the powerful computer, but the wording of assignments could help steer them to the appropriate model.

In choosing a computer for Web access, the primary considerations are: a) the Internet connection; b) the operating system; c) the processor; d) the memory; e) the video subsystem; and, to a much lesser extent, f) the audio and g) the hard disk.

Connection Is King

There's an old adage that to succeed in real estate, you need three things: location, location, location. It's the same on the Web, which has its own three keys to success. They are, of course: connection, connection, connection.

The minimum speed you need for a decent Web connection comes with a 28.8 Kbps modem. These days, such a device costs about \$110. That's roughly 30 to 35 percent more expensive than a 14.4 Kbps modem, but it provides a 100 percent improvement in performance.

On the highest end of the spectrum is a T-3 line, a direct connection through dedicated data lines that can transfer information at a rate of 44.7 Mbps, or more than 3,100 times the rate of a 14.4 Kbps modem. But the T-3's expense makes it unrealistic for mere mortals. A

more realistic alternative is a T-1 line, also a direct Internet connection, which offers a transfer rate of 1.54 Mbps, or more than 100 times the speed of a 14.4 Kbps modem. An increasing number of schools lease such lines from the phone company. You should realize that a T-1 is split among 24 users, who can send and receive data at 64Kbps, still more than quadruple the rate of a 14.4 Kbps modem. The PCs and Macs in our school lab and offices were networked for the purpose of Internet access and connected to a T-1 line. To measure the

It's a waste to use a well-endowed multimedia PC for text-oriented Web sites.

change, I kept one computer with a 14.4 modem, and the difference between it and the T-1 is awesome.

Still, those schools that don't have a direct connection should not despair. Modems that run at 28.8 Kbps are decent for most applications and Web sites (except video). Anything slower, however, is simply out of the question for Web purposes.

You may have heard about ISDN adapters connecting at 64 and 128 Kbps. (They are often called modems, but this is incorrect since there's no need for modulation and demodulation.) I cannot recommend them. I've been hearing about them for 10 years, but have hardly ever seen them perform. Also, ISDN adapters tend to be expensive, as are their service charges. I would rather hold

my breath for modem cables, which will connect computers to the Internet using high-bandwidth fiber optic lines. In the meantime, I'd invest in a 28.8 Kbps modem if a T-1 connection is out of the question. By spring, there will be software available to let you upgrade this modem to 56 Kbps.

Some Caveats

Now let me mention the caveats to the "connection-is-foremost" rule. One is that your other hardware components must be up to the task, as well. Even a T-1 line isn't enough at an MTV-like site if you have a slow processor that can't cope with decompressing streamed audio and video clips, or a 14" monitor that can't really show the action.

Then there's software. For instance, what can make a significant difference in speed—and thus in the quality of connection—is your choice of multimedia helper applications and plug-ins, which assist your browser in playing back multimedia files it could not otherwise handle, such as AVI and MPG video or MID and WAV audio.

Even your browser can make a difference. In my experience, Internet Explorer 3.0 delivers Web pages faster than Netscape Navigator 3.0, though this view is subjective and your experience may vary depending on the sites that you visit.

Sometimes speed of navigation de-



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Web PC Alternatives

Budget PC

High-End PC

Processor	Pentium (or compatible) 75 Mhz	Pentium (or compatible) 133 Mhz
Memory	8MB	16MB
Hard disk	640MB	1.6GB
Video memory	1MB RAM	2MB RAM
Monitor	15-inch	17-inch
Telecom	28.8 Kbps modem	Ethernet card for T-1 connection
Soundboard	Soundblaster	Soundblaster
Speakers	Any	Labtec LCS-1021
Operating System	MS Windows '95	MS Windows '95
Approximate Price	\$1,300	\$2,000

depends more on a Web page's design than on the data transfer rate. An ill-designed site, without appropriate structuring and signage, makes users feel lost and waste time stumbling around.

If you're searching a database, there are other factors you can't control. For example, the same Grolier database snaps images on the screen two to three times faster from America Online than from CompuServe. That's not because of the differences between AOL 3.0 and CompuServe Information Services 3.0 but because the AOL version of Grolier uses ART, a better image compression format.

In our zeal for multimedia and faster connections, we also should not forget what a difference search software can make. While AOL has endowed the Grolier encyclopedia and other reference sources with an excellent search engine, the one from CompuServe is very simple-minded. The point is there are many tricks that can significantly improve your Web experience beyond the mere muscle of your hardware.

There are other exterior factors that can define your Web browsing experi-

ence. Traffic jams on the electronic highway or congestion at your destination site are as much of a problem for your T-1 connection as cars backed up on the real highway or a bottleneck at

**Sending
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selling orange
juice in
concentrated
form.**

the ramp you want to exit in your Porsche (yeah, sure, a Porsche on a school librarian's salary!). Finally, when downloading very large programs, the transfer rate on even a T-1 connection occasionally deteriorates to

that of a 2400-baud modem, then accelerates again to that of a T-1.

The Operating System

While graphical Web browsers are available for most operating systems, the helper applications and plug-ins for Netscape Navigator and ActiveX controls for Internet Explorer are not. MacOS versions are usually marked "coming soon"—not unlike "your check in the mail." Unix, Windows 3x (which includes Windows 3.0, 3.1, and 3.11), and OS/2 versions are often not even considered by the developers, while NT versions are not yet developed widely. Clearly, your best bet is Windows '95, since most multimedia browser utilities are available for it. Otherwise, you can run Windows 3x (also known as 16-bit) versions, with some performance degradation.

A growing number of these browser utilities are being built into the browser itself, but there are many that need to be downloaded and installed—assuming you have the appropriate operating system platform.

Processor and Memory

My recommendation for an operating system has also defined the type of processor to get (and probably raised the ire of librarians who love the Macintosh). I discuss processor and memory under the heading because the two components complement each other. For instance, a PC with a 100 MHz processor and 16 MB of RAM can be the equivalent of a machine with a 120 MHz processor and only 8 MB of RAM.

Though most Web applications are not computing-intensive, processor speed is still critical. That's because most multimedia elements are sent from the server in compressed form, to save download time. The reason is the same as for distributing orange juice in concentrated form. Cans can be distributed much more efficiently than plastic gallon bottles, which makes them less expensive. The only difference is that canned juice has to be melted, then diluted with water by the consumer. Similarly, compressed images, sound, and video clips can be delivered much more efficiently on the Net. But like canned juice, they must be decompressed by the user for playback, and that's where the speed of the processor is crucial. Just as the hotter the water the faster the can's contents melts, so the faster the processor the sooner the image is displayed. And the faster the processor, the smoother the streamed audio and video plays. (Streaming technology allows you to start using audio or video before the entire file arrives in your computer.) The minimum processor speed I would recommend is a 75 MHz Pentium for a budget system, and 133 MHz for a power system.

As for memory, though you can survive with 8 MB of RAM, I strongly recommend 16 MB for the power version of your system. Usually, this will increase the price of the computer by only \$100 or so if you upgrade at the time of purchase. Beyond the obvious advantages of a larger workspace, extra memory comes into play in other situations as well. For instance, I often open two Web sites simultaneously in separate windows in order to browse one while the other downloads a file or develops an image. I simply flip between the two using the ALT/TAB keys. On an 8MB system, I would frequently run into memory limit problems.

The Video Subsystem

On the Web, most images are of the 8-bit type with a 256-color palette. One reason for this is that 16-bit or 24-bit images would act somewhat like 18-wheelers on the highway, using much more

road space than a compact car. The other reason is that the GIF format is limited to a 256-color palette. Both these factors make video controllers with 1 MB of RAM sufficient for a budget PC, and

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2MB video RAM sufficient for the power PC.

As for monitor size, 15 inches is fine for the budget PC, but for the power version, I'm more inclined to recommend a 17" monitor. This differs from my recommendation for the multimedia CD-ROM workstations, and there's a reason. While you typically would not run a multimedia CD-ROM application simultaneously with another program, on the Web I recommend keeping two windows open side-by-side and working in both, rather than twiddling your thumbs watching the "connecting to www. eternity.com" message that flickers for minutes before some fancy but not-very-useful wallpaper appears on your screen.

Other Hardware

The other components that I discussed in my previous article are of less importance for Web use. The size and speed of your hard disk, for instance, would not make as much difference as it would with CD-ROMs. And even the smallest hard disks today include at least 640 MB, with about 15 msec for access time. That suffices for Web usage.

For heavy-duty multimedia Web applications, I do recommend a large hard disk because it lets you pre-download a series of Web pages on your hard drive for a demonstration. This way you're not left at the mercy of Internet traffic while you demonstrate something to students. (I recommend Microsoft's spiffy Internet Jumpstart CD; it's free to schools, and among other useful items, includes a downloading utility called Webwhacker.)

An increasing number of Web sites offer sound, but not even a Bose speaker with subwoofer would improve the

sound quality. Therefore, a cheap, Kmart-league soundboard-and-speaker combo would do for the budget PC, while a somewhat more expensive Altec Lansing sound unit would work for the power version. You won't need a CD-ROM drive, unless you want to use the above-mentioned Internet Jumpstart disc, or to upload browser and browser utilities from Internet free-ware and shareware CD-ROMs. While these CD-ROMs may sound like a good idea, they change so often that their utilities are frequently outdated by the time you upload one. It's better to download an application from the developer's Web site during a quiet hour at the library (if your library has such a time).

If your configuration happens to include a CD-ROM drive (most likely a 6X or 8X drive), don't worry. It's better to leave it as is, since the drive may come in handy when you want to replace a single-speed drive in another PC, and you would only shave \$80 to \$100 off the price of your power PC by taking the drive out.

What to Buy

You can buy the budget PC described above for about \$1,300 early this year, and a power version for about \$2,000. The chart on p. 32 summarizes the minimum configuration that I recommend. The price you pay depends a lot on where you shop. Though it's hard to keep up with changing prices, there is a superb Web site with which no human can compete (www.pricewatch.com). Check out the most current models and prices, presented in ascending price order with hotlinks to vendors. I consistently found the best deals at Computer Discount Warehouse (800-356-4239), and at PC Compleat (800-234-6882).

You may have noticed that I did not mention the network computers we hear so much about these days. As I pointed out in *SLJ's* August News section (p. 16), I am still not thrilled about the prospect of buying a computer, allegedly for about \$500, that does not have a monitor, a hard disk, a floppy drive, an Intel-compatible processor, one of the standard operating systems, or expansion capabilities. This configuration is based on the much-touted NC specification by Oracle, but I don't think the company will prove to be an oracle in this case. Among other concerns, I worry that I'd be stuck with a single trick pony when all around me people have real computers they can use for many things when the surf is not up. □