The advantages for the enterprise of going to 64 bits may not come immediately.

The World Wide Web is giving affordable exposure to candidates in local elections.

Run or Walk to 64-Bit Computing?

When you add it up, the advantages of 64-bit computing over current 32-bit technology seem obvious: processing eight bytes at a time versus four bytes at a time. The conclusion also is obvious: The IT world will rush to it, just as everyone is rushing now from 16-bit to 32-bit PC computing.

Actually, this stampede may not happen overnight. The march toward 64-bit operating systems, applications and microprocessors is inevitable, but for users the transition to enterprise-wide 64-bit computing will be a complex and, in some cases, a costly one. Vendors will be expected to deliver on their promises to develop hardware and software standards.

More significantly, the performance advantages that are obvious in the move from 16-bit to 32-bit PC computing aren't so apparent with 64-bit servers for enterprise and midrange systems. In fact, at this point 64-bit computing may not even deliver better performance or functionality for all applications, all of the time.

When I'm 64

Having said that, it remains easy to point to what is better about 64-bit technology. First and foremost, a 64-bit machine can address more memory directly without using complex indexing or register-addressing schemes. Because internal memory is several orders of magnitude faster than most storage devices, combining a 64-bit processing architecture with more internal memory enables a CPU to pull more data into memory and operate on it directly, thereby increasing performance.

A 64-bit file system also can improve disk management. Rather than having to take a large disk, such as a 9GB storage module, and be forced to segment it down into 32-bit chunks (2GB each), you can address the entire disk. That can help, for example, both database performance and the performance of the operating system itself.

The move to 64 bits will help primarily users who need access to very large data stores. This category includes applications in CAD/CAM, science and engineering, human resources, online analytical processing (OLAP) and financial modeling. Users working with these compute-intensive applications will probably see immediate improvement with 64-bit machines over 32-bit machines running at the same clock rate and with similar memory capacity.

Standards and Coordination

What complicates the move to 64 bits, for both end users and vendors that develop and sell the technology, involves the careful coordination of several factors, starting with software standards. A 64-bit version of Unix is being developed jointly by Hewlett-Packard, the Santa Cruz Operation and Novell. Their plan is to issue, perhaps in 1997, a single Unix operating system designed to run on the 64-bit P7 chip now being developed by HP and Intel.

In addition, over 50 companies, including DEC, HP, IBM, Informix, Intel and SunSoft, have announced an initiative for a 64-bit Unix application programming interface (API) to be delivered to X/Open, the standards consortium, in the first quarter of 1996. As designed, this Unix API will enable developers to write applications that will run on any 64-bit Unix architecture.

As with other standards, each company has vested interests in this one. DEC,

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Chasing the Online Vote

As we all know, this presidential election year will be filled with rhetoric in the form of television, radio and print advertising. The 1996 election will also see extensive use of the World Wide Web by parties putting forth their positions, criticizing their opponents and receiving e-mail from the voters. Each of the current Republican presidential contenders has his own Web page. This even includes Pat Paulsen, the comedian from the 1960s Smothers Brothers television show (http://www.amdest.com/Pat/pat/html). While everyone expects this broad use of the Web in national politics, it is having an even greater effect on the local political scene.

In Virginia, as in many other states, off-year elections are for local government positions such as the school board, members of the general assembly and other state and county officials. During the campaign our street corners and telephone polls become covered with posters showing the names and faces of people most of us have never heard of. We also find numerous flyers on our doorsteps and car windshields, briefly giving the qualifications of the individuals or sometimes only a negative message about the candidate's opponent. It's hard to get excited about the impending election unless you have a particularly important issue at stake.

That was my situation this past November. Virginia was holding elections for our representatives to the state and local governments, school boards and so on. One day I received a flyer from Charles Waddell, a man running for state senator from my district. After scanning Waddell's flyer and just before throwing it away, I noticed a Web address printed at the bottom, inviting people to visit his home page (http://www.shirenet.com/waddell).

When I logged onto that page I found the candidate's biography, current positions on key issues, a legislative schedule and a link to an e-mail connection. I was able to read his position

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Sun and others already have 64-bit products on the market. These companies realize that now is the time to agree on 64-bit standards, as they face pressure from independent software vendors (ISVs) and users to work together.

William O'Leary, IBM spokesperson in Sommers, NY, supports the Unix API initiative. "We all realize that if you suddenly go off on a new path and cause any work done by the ISVs to be nullified, you're going to tick off a lot of ISVs," he says. "The ground rule going into this 64-bit development is to preserve work or build on it."

In addition, both hardware and software 64-bit products must be introduced at about the same time. Some 64-bit machines can process both 64-bit and 32-bit instructions, and translators exist to convert 32-bit programs to slow but functional 64-bit programs. For the most part, however, a 64-bit machine needs a 64-bit operating system and 64-bit applications; and a 64-bit operating system runs only on a 64-bit machine. Therefore, all parts of the technology should emerge together, so one area of development doesn't act as a drag on the others.

DEC learned that lesson the hard way by being first at the dance with the Alpha chip. The company didn't have any partners: Not enough 64-bit applications had been written for users to take advantage of Alpha processors. "DEC leaped to 64-bit, but then they found that they had to convince the world that it was necessary," says Jim Turley, editor of the newsletter *Microprocessor Report* in Mountain View, CA. "It's been rather a hard sell."

Moving Expenses

Another factor to consider is the basic cost of moving to 64-bit hardware and software platforms. Major vendors and developers in the industry assert that the transition to 64-bit doesn't have to be painful.

Phiroze Petigura, systems software program manager at Hewlett-Packard in Cupertino, CA, says, "The basic objective is not to require any port to 64-bit." He claims that HP will provide full compatibility with 32-bit applications, so ISVs will be able to move their applications through binary compatibility. Later they can reengineer aspects of the applications for 64 bits.

Other observers aren't so sanguine. They contend that, although users might be able to save some storage modules and input/output (I/O) devices, or mix 32-bit and 64-bit platforms through networking protocols such as TCP/IP or IBM's SNA to ease the migration, the move will be a big one. If processors are upgraded to 64 bits, the operating system for them will have to be upgraded as well, along with all the applications, unless the microprocessor makes allowances for running the old code in some away. Each addition to this process adds cost.

Not So Fast

The final reason that might delay this emerging market is that 64-bit computing doesn't always guarantee increased performance. "Microprocessor architecture is not an absolute metric of performance. There are many different factors," says Dan Kusnetzky, research director for Unix and server operating environments at International Data Corp. in Framingham, MA.

Kusnetzky suggests that the performance of PC applications, for example, might not be significantly better with 64-bit computing. When the operating system is screen- and graphics-oriented, the bottleneck will be the screen and graphics hardware. If a machine is doing database access, the bottleneck moves to the storage subsystem. With a network server, it's the network subsystem. "If an application is waiting on the disk," he says, "it doesn't matter if it's a 32- or 64-bit application waiting."

For another instance, many word processing applications deal with text in the form of characters, one character at a time. Some 32-bit processors have better character instructions than, say, 64-bit reduced instruction set computing (RISC) processors. RISC architecture has limited character instructions, and this forces the developer to use more complicated programming to pull individual characters out of a word and manipulate them. This additional work slows the word processing application enough so it might actually run faster on a 32-bit machine.

The Ultimate Goal

IT vendors have found time and again that business customers seldom jump to new technology for its own sake. Benefits must justify the costs of migration, and the cost/benefits calculation has to include whether less expensive alternatives can be used, at least as an interim solution.

If the goal is to improve performance

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on a tax initiative that was of particular interest to me. I sent electronic mail asking Waddell to explain his position more fully and received a response the following day. My use of the Web drew me into the campaign more than usual.

Cost-Effective Campaigning

My experiences with that election made it obvious that political contests have taken a turn. Many of us get our political information from television and radio sound bites, and newspaper articles. This includes paid advertising by the candidates. But for the person running for local office this is a difficult, expensive process. In the DC area, as in other large metropolitan areas, the local politician doesn't get nearly as much free media coverage as do those running for national office. *The Washington Post*, for example, spends most of its space covering the presidential and congressional candidates. It gives little space to the state candidates and virtually none to those running for offices such as the local school board. With two states (Maryland and Virginia) and the District of Columbia in its subscription base, the *Post* cannot provide complete coverage of the local issues.

By using the Web, a candidate can get his or her message out for a modest fee. The Web page can be updated daily with the latest position or details of the opponent's latest miscues. E-mail between the electorate and the candidate can serve as an adjunct to the required "pressing of the flesh." The person running for a local office can have essentially the same exposure as Bill Clinton or Bob Dole. Furthermore, those of us who find it difficult to follow these issues are being better informed and therefore are able to cast a more intelligent vote.

According to Dave Whitmer, who provided the Web pages to Charlie Waddell and several other candidates in northern Virginia, the Web provides a more level playing field. A candidate with limited resources can get a Web site. The large number of people with access to the Web in an urban area makes its use even more justifiable. Dur-

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by having more data reside in memory, one alternative to 64-bit processing would be to use a solid-state storage device with intelligent controllers. Rather than touching the disk, which takes multiple milliseconds, the processor touches solid-state memory that is on the other end of a SCSI channel. Response times drop to the microsecond range, so performance would improve dramatically, even with 32-bit processors.

Jerry Huck, manager of architecture for HP's PA-RISC microprocessor development in Cupertino, CA, stresses that the decision to move to 64-bit processing should serve an apparent need. "You need some sort of capacity problem where you're going though a lot of trouble to mimic large addresses or larger data types," he explains. "If you really don't need 64-bit, don't get on it."

Huck predicts that the transition of applications to 64 bits won't be as fast as in 16-bit-to-32-bit migrations. He points out that predictions about the rate of migration to 64-bit computing are being moved back because memory systems aren't growing as fast as anticipated and the performance downside of moving to 64-bit is more noticeable, partly because of the reasons mentioned above and partly because 64-bit applications usually deal with greater amounts of data.

If a user has a huge database, 64-bit computing will handle it more efficiently. But Huck warns users to be cautious. "If you go willy-nilly into the 64-bit world, you might find yourself in a worse position than before." IT

—Richard Cole

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ing Waddell's campaign, his Web page averaged approximately 800 to 1,000 hits per month. While most were from this area, some came from other parts of the country and even from overseas. Although a few messages were from people of the same name asking about his ancestry, a majority were from his district asking about the issues.

No Guarantees

A total of six candidates in northern Virginia had Web pages. Interestingly, they were all Democrats or Independents with support from the Democratic Party. Of the six, only two won their elections, which indicates that using the Web doesn't guarantee victory.

Charlie Waddell was one of the winners. He feels that the Web will never replace public hearings and other face-to-face meetings for candidates and elected officials. However, it does increase communications with the citizens. Waddell calls the Web a "powerful tool" for politicians. He says that while it wasn't the overriding factor in his election, it did help, and he plans to continue using it.

Whitmer is currently modifying Waddell's home page from "campaign mode" to one that will provide constituent support services to Virginia's 33rd legislative district. In it will be the status of current bills, electronic mail to Waddell and his staff and links to the State of Virginia's home page (http://www.state.va.us/dlas/welcome.htm). Waddell claims that he really "doesn't know the technology" but that it doesn't matter. The Web allows him to reach out to the public, which (as a politician) he does know a lot about.

The Web is providing many politicians another platform for getting their messages across. For those who have limited advertising budgets, such as state and local candidates, the Web is proving to be an indispensable tool. In addition, it's allowing us voters to participate more fully in the process. If a candidate has a Web page or simply e-mail capability, we no longer can sit back and complain that the process doesn't easily take our inputs. By using the Web, we are able to compare the positions and press releases of the candidates in far more depth than sound bites. And if one of the candidates doesn't have a Web page, I predict that, lacking other sources of information, we will likely not cast our vote for that person.

In any highly competitive market, everyone seeks an extra edge; the Web is providing that edge. The use of the Web by some politicians will require all the others to follow suit. Candidates will still try to get the press, television and radio coverage. Countless meetings will still be attended, and "rubber chicken" dinners served at fund-raisers will still be eaten. But the local candidate now has a new tool to get the message out and perhaps reach a different demographic slice of the electorate.

I must go now. In my quest to be a better informed voter, I need to get Pat Paulsen's take on Bosnia. IT

—Gary Donnelly