The Cutting Edge

Blade technologies are changing the way companies are looking at IT

By Jim Utsler

By now, it's likely that everyone IT on the planet has heard of blades, those skinny little computing modules that slide into space-saving chassis. And many of those IT folks have already deployed them, whether to consolidate their many standalone servers, free up space in their data centers or save energy.

There's much more to the current crop of blades than one might expect, especially those coming from IBM. No longer simple x86 modules that lessen floor space, these new IBM® blades—specifically the POWER6™ technology-based JS22 and the newly announced JS12—are poised to drastically alter the computing landscape.

This may sound like hyperbole, but it isn't. Thanks to their new chip underpinnings, these two blades are offering capabilities few would have guessed at just a few years ago. The keyword here is convergence. That is, the capability to run multiple OSs on individual blades or even, thanks to advanced virtualization—in the form of IBM PowerVM™—on single blades.

We're not just talking Windows® and Linux® as with x86 blades. Now, IBM blade users can deploy the IBM AIX® OS and i OS, formerly i5/OS®, on these modules, running them alongside the aforementioned OSs by mixing and matching x86 and POWER blades in the same chassis, giving users a single, smaller—yet powerful—footprint in which to do all of their computing.

As part of this effort, IBM has also announced the new BladeCenter™ S chassis. Capable of holding six blades and supporting up to 12 internal hard drives, it complements the JS22 and JS12 blades by putting them into a small, attractive and portable chassis that's quiet, convenient and expandable—perfect for small to mid-sized businesses (SMBs). For those with beefier requirements, there's the larger BladeCenter H chassis, which supports up to 14 blades.

Thanks to these advances in blade technologies, there's no denying that IBM and its blade and BladeCenter users are on the cutting edge.

Serious Evaluations

"Indeed, the IBM BladeCenters systems have come along way. Originally, they were based on the PowerPC® 970 chip, with its floating-point AltiVec engine," adds **Scott Handy**, Vice President of Worldwide Marketing and Strategy for IBM Power Systems. This engine made the blade popular among the high-performance computing (HPC) crowd, with its capability to run fast and in clusters. IBM broadened blades' appeal by introducing many of them based on the existing x86 architecture, allowing organizations to run Windows and Linux on them. This move is likely what helped turn blades into not only high-performance computing devices,

but also into everyday back-office appliances.

At that point, users could augment their specialized hardware platforms (mainframe, open systems or midrange, for example) with small, clustered computing modules that could connect with their primary servers. This has

Because the BladeCenter S, like the BladeCenter H, is plug and play non-techies can easily swap out blades and storage as needed.

allowed many of them to jettison their standalone servers in favor of a much more compact form factor, with BladeCenter systems taking up less space than one-off PC servers while offering the same—and sometimes improved—functionality. For example, blades can share disk, power supplies and networking cables, negating the need for one—or two—for each standalone server.

With the introduction of blades running POWER6 technology-based processors, which consume about the same amount of energy as their POWER5™ technology-based predecessors while running twice as fast, users can expect even more. In addition to still playing an important role in the HPC environment, thanks to the continued use of AltiVec, along with a new decimal math accelerator in POWER6 processors, average business users will have increased opportunities to both speed up their standard workflows and consolidate their server environments. As Handy explains, "Because you get so much processing power in a very small amount of space with great energy efficiency, people who are looking to consolidate large numbers of servers into a dense configuration will want to seriously evaluate these."

Year After Year

The JS22 is the powerhouse of the new blades. It has two sockets, each running two dual-core POWER6 processors, for a total of four cores. Additionally, it supports up to 32 GB of memory, making it, as Handy puts it, "a pretty big server," which is made even bigger when the JS22 is placed in the 14-module BladeCenter H chassis. For example, one rack of IBM POWER6 technology-based blades can take the place of 23 racks of IBM rival Sun's latest UltraSPARC processor-based servers saving tremendous amounts of space and energy while also providing more performance, according to Handy (www.ibm.com/press/us/en/pressrelease/22559.wss). "That's like taking 180 of their servers and replacing them with 56 of our servers, by putting 14 blades in each H chassis and four chassis in each rack," he notes.

The JS12 has similar consolidation capabilities, although it only comes with one socket, for a total of two cores. This blade has another audience in mind, specifically SMBs that may require less horsepower but more memory. Whereas the JS22 can support up to 32 GB of memory, the JS12 supports up to 64 GB of memory, making it a fine companion to, for example, memory-hungry ERP applications. "SAP is very interested in moving to a blade infrastructure with us and is very interested in POWER," Handy says. "But they're not as interested in having four cores so much as they are in having more memory, so we made that substitution." Aside from fewer sockets and increased memory support, however, the two blades offer essentially the same benefits, including improved consolidation in a very dense chassis and rack configuration.

Of course, that's a major part of the blade story: reducing the number of racks in the data center. This not only
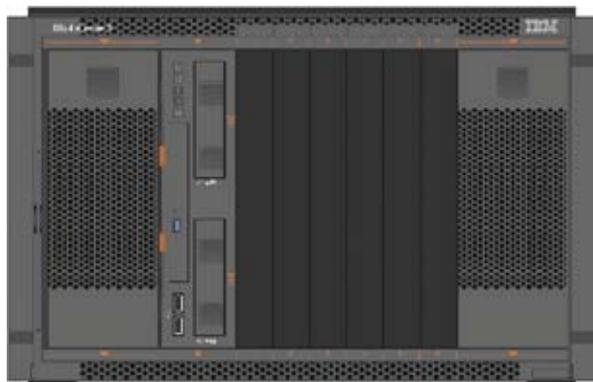
IBM BladeCenter S

IBM BladeCenter H

JS22
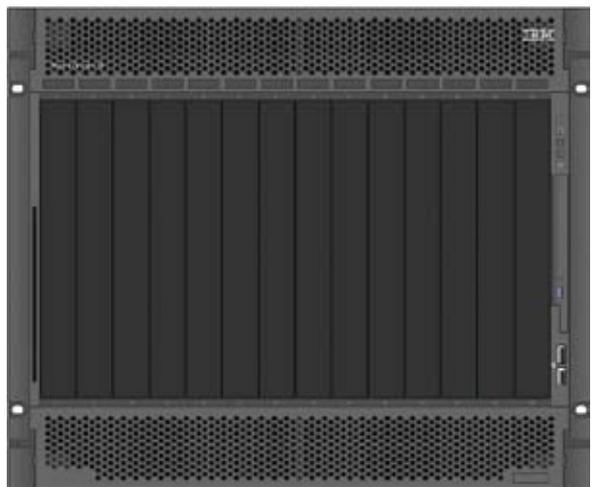
frees up floor space, but also decreases energy usage. As Handy points out, using the aforementioned Sun versus IBM example, "If you put 23 racks into one H rack, that's a 92-percent savings in power alone. Over the course of three years, that could be more than $400,000 in savings, not including another $200,000 in cooling. And then there's the 95 percent savings in floor space. So when you do the math, you could actually pay for the entire BladeCenter rack system in three years just in power and cooling savings alone. And then it just keeps giving and giving after that, year after year."

Using the newly announced BladeCenter S chassis, which, although smaller, can accommodate both JS22 and JS12 blades as well as x86 blades, can also result in reduced costs, which includes its lower initial upfront cost. It holds up to six blades and includes support for up to 12 internal hard drives. The inclusion of those drives, both SAS and

SATA, negate the need for sometimes-expensive external storage, making the BladeCenter H very easy to manage. As a bonus, storage modules are hot-swappable, meaning users won't have to take their systems offline if they want to

The research firm IDC predicts that 20 percent to 25 percent of all server volumes will be in a blade form factor by 2010

—Scott Handy,
IBM Vice President of Worldwide Marketing and Strategy, IBM Power Systems

add or remove storage. If, however, users choose to use the H chassis in a storage-area network (SAN) environment, they can, attaching it to IBM System Storage™ DS storage devices.

Because the BladeCenter S, like the BladeCenter H, is plug and play non-techies can easily swap out blades and storage as needed. IBM engineers made it even easier to manage because it's on wheels, has finger grips, was built to

reduce noise, offers a passive dust filter and can come configured with a built-in monitor and keyboard, both of which slip in and out of the S chassis body. "The integrated monitor and keyboard just folds flat into a drawer and slides into the chassis," Handy remarks. If users choose not to go with that option, they can easily attach their own monitor and keyboard. The BladeCenter S is also nice to look at, with its sleek black profile and rounded edges, allowing users to put it in a retail environment without arching the eyebrows of curious customers.

Handy expects that the BladeCenter S will be very popular with IBM System i™ users who would like to run i alongside blades running x86 and Linux technology-based applications in the same—and smaller—footprint. As he explains, "System i customers like very simple and integrated environments. But within those environments, they also have Windows and Linux servers. So the idea of putting all of this—i, AIX, Linux and Windows—into one small package is very appealing to them."

On the Move

Although the new BladeCenter H and S offer dense rack configurations, there's much more to this consolidation story. In the case of IBM, it comes in the form of the recently announced IBM PowerVM virtualization software, which includes three editions: Express, Standard and Enterprise. The Standard Edition comes free with all POWER6 technology-based blades, including the JS22 and the JS12, unlike competitive virtualization offerings, which can cost around $2,500 per socket, making virtualization for consolidations yet another money-savings benefit to these new blades.

Thanks to PowerVM, users can run up to 40 OS instances on each blade (10 per core) on a 4-core JS22 or 20 instances on the 2-core JS12. These instances can include a mix of OSs, including AIX, i and Linux. Workloads on these instances can be dynamically reallocated without rebooting the system. They can also

add or remove memory and, also as part of PowerVM, use virtual I/O to share network and Ethernet adapters, as well as memory and storage. "You won't have a bunch of cables lying around," Handy notes.

Also noteworthy is these POWER6 technology-based blades' capability to run Linux x86 applications in chip "emulation"—or chip-level translation—mode, using IBM PowerVM Lx86. Rather than purchase a blade specifically for a Linux application, users can take advantage of Lx86—which is included with all three editions of PowerVM at no additional charge—to run Linux and Linux x86 binary applications on the new POWER technology-based blades, without recompilation, and, because of the performance of the POWER6 processors, have fewer performance hits for many applications compared to slower x86 servers that may be being consolidated onto newer POWER blades. "As soon as a Linux x86 application launches, it's immediately detected as being non-POWER, and the operating system will automatically put it in the Lx86 environment and execute it," Handy says. "We've had beta users testing and using this in their production environments for months now, and they love it."

The PowerVM Enterprise Edition has a few more tricks up its sleeve. For example, if AIX or Linux users want to move partitions from one server to another, they can do so dynamically, while the system is up and running. (The AIX OS or the latest versions of Red Hat and Novell SUSE Linux are required to take advantage of this functionality.) A function of POWER6 called Live Partition Mobility simply handles the dynamic creation of a du- plicate image of the same definition on the other server and keeps the first one running while an exact copy is created, including all of the memory pages as they're getting popu- lated. "Once everything's in

IBM BladeCenter S with JS12

sync, there's a quick, up to two-second pause in the application as it switches from one server to another," Handy ex- plains. Similarly, users can also do this with individual applications, using Live Application Mobility, a new function built into AIX 6.

This is all part of the larger all-the-time-uptime philosophy behind all of IBM's servers. Rather than take them offline to move partitions or applications or to apply OS or hardware firmware patches—or in the case of swapping out disk in the BladeCenter S—users can keep their servers up and running, without impacting the business. Some innovative early testers have even begun using these mobility options to move partitions to fewer blades during off hours to save on server operating and cooling costs. "They said it was so easy that when they all went home at night, they would move from 12 servers to three servers and shut the inactive ones down, and when they came back in the morning, they would move everything back," Handy recalls. "They said it was one of the easiest ways to save on energy costs."

A Change in Numbers

All of these new announcements, including the POWER6 technology-based JS22 and JS12 blades, and the BladeCenter H and BladeCenter S, as well as PowerVM, are pointing to a new computing future. And according to Handy, it's all about convergence, whether on the hardware level, with consolidated blade chassis and racks, or on the software level, with users running multiple OSs, including AIX, i and Linux, on separate or even the same blades.

And people are already beginning to take notice, as Handy explains. "The research firm IDC predicts that 20 percent to 25 percent of all server volumes will be in a blade form factor by 2010," he says, citing a Feb. 2008 study. Given all of the benefits blades have to offer—especially the POWER6 technology-based blades and other blade technologies coming out of IBM—this is hardly surprising— and those IDC numbers may have to be amended upward soon. **CC**

About the Author
Jim Utsler, IBM Systems Magazine senior writer, has been covering technology for more than a decade. Jim can be reached at jutsler@ msptechmedia.com.

19