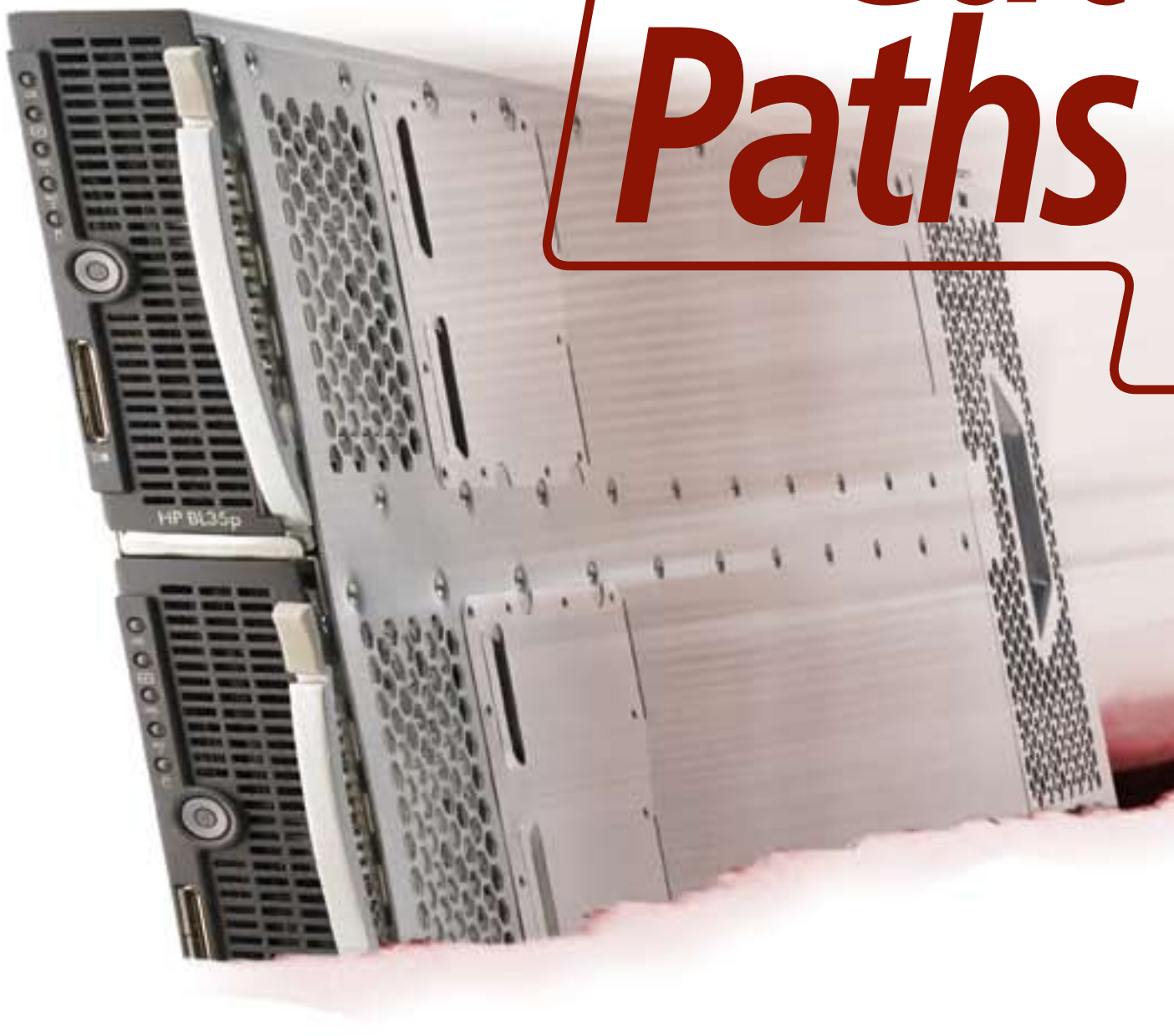
Blade Servers Cut Paths



Compute-dense, space-saving and cost-cutting servers offer advantages to an ever-growing number of enterprises

to Progress.

In today's cost-conscious and productivity-driven business environment, few challenges loom as large as managing information technology resources. Organizations that lack adequate computing power often find that it's impossible to keep up with the demands of the marketplace. Yet, those that throw technology at every business problem often wind up creating an unmanageable and expensive IT environment — particularly when numerous applications and servers enter the picture.

These days, things aren't getting any simpler — especially as the demand for information technology grows and more sophisticated enterprise data requirements take hold. "Companies are looking for ways to optimize their computing environments without spending a great deal more money," observes Anil Vasudeva, president of IMEX Research, a San Jose, Calif.-based IT consulting and market research firm. "They want to leverage industry-standard, low-cost servers, yet be able to maintain high availability while achieving high performance. Clustering and virtualization technologies achieve these goals by using resources more efficiently and effectively."

As a result, many businesses are turning to blade servers. These units, which consist of multiple server cards enclosed in a specialized chassis, offer a more efficient architecture for managing multiple applications, databases and storage devices. Blades — so named because they consist of several servers within a single chassis — are rapidly moving into the mainstream. In the process, they are replacing more expensive and complicated mid-range and mainframe computers.

IMEX Research reports that sales of blade servers grew from near zero in 2001 to about $2.2 billion in 2005. At present, about 7 percent of servers used within the enterprise are blades, but the figure is expected to hit 32 percent by 2009. "Blade servers represent a paradigm shift in computing. They are extremely fast and responsive but they also provide enormous scalability and flexibility," Vasudeva explains. "Consequently, they are replacing

more complex and expensive computing models."

Businesses, universities and research facilities are turning to blade servers to tackle a diverse array of complex computing applications, including gas and oil exploration, engineering and computer-aided design (CAD), movie-making and sophisticated scientific or financial modeling. Meanwhile, others are plugging into blades to balance heavy computing loads among numerous applications, such as enterprise resource planning (ERP), supply chain management (SCM) and customer relationship management (CRM).

Yet, like any technology, blades represent both an opportunity and a challenge. They can boost computing power, improve resource utilization, simplify IT administration, diminish the need for data center space, ratchet up scalability and cut overall energy costs. However, provisioning and managing resources requires specific IT skills — and a keen knowledge of business processes. Moreover, blade servers — packed with a high density of electronics—require adequate cooling. Finally, they demand software that can connect and optimize an IT environment and provide the necessary administrative controls.

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> — Anil Vasudeva, President, IMEX Research

The Leading Edge

The concept of stacking multiple servers into a single unit originated in the telecommunications industry in the 1990s. Telephone companies began using modular units for switching equipment used in their central offices. By 2001, the first blade servers emerged for the computer industry. While these early models offered significant performance improvements and notable cost savings over standalone servers, they also presented compatibility challenges. Additionally, many units weren't equipped with software to manage data flow.

Fortunately, times change. Today, blade servers have become more powerful, less expensive and easier to integrate into an IT environment. By packing as many as 14 blades (each 7U high; 1U represents 1.75 inches) into a standard 19-inch-wide chassis and using several chassis in racks of blades, it's possible to achieve computing power that would typically require hundreds of standalone servers. What's more, each chassis of blades shares a single I/O (input/output) and power supply. Some use their own disks to create a fully integrated server, while others rely on common external disks for storage.

Blades address several important issues. Organizations with a less-than-optimal server infrastructure often find that they must add servers faster than the corresponding growth in business activity; they wind up adding multiple servers for every new application; and they achieve sub-par performance and service levels. In the process, the IT department finds itself coping with time-consuming administrative tasks. The operating cost of a typical data center runs seven times that of acquisition costs, Vasudeva says.

IMEX's Vasudeva likens the situation to hosting a conference at a hotel. If all rooms are the same size, some sessions are likely to overflow and become standing room only, while others have plenty of seats available. This inefficient use of resources can be remedied by using partitions and readjusting the rooms to accommodate the projected size of the audience. In the end, planners can provide adequate seating for everyone and improve the comfort and quality of the conference.

Multiple Advantages

IT experts, including Vasudeva, believe that blades represent an important step in the evolution of computing and network technology. "They produce volume efficiencies to the order of magnitudes," he says. "They boost utilization levels in today's computing environment from the 25-to-30-percent range to 80-to-90 percent." Blade servers achieve these results through virtualization or pooling of resources. Simply put, various applications and tasks share CPUs and disk space. Instead of a single application, such as payroll, CRM or ERP using a dedicated server, each application draws the resources it needs from the pool of servers.

In fact, virtualization partitions a server into several "virtual machines" that can run within a separate operating system and application environment. This moves businesses away from a "one server, one application" model and toward an infrastructure that allows the organization to manage its servers across a heterogeneous environment. Using different operating systems and applications on the same physical server also lets organizations consolidate the workload placed on its servers. If one virtual system fails, another can take over instantly and perform the same tasks.

Another advantage of blades is that they allow an enterprise to take advantage of the efficiency and reliability of clustering technology. Using data replication, mirroring and load balancing techniques, an enterprise can route incoming requests across identical blade servers that run enterprise applications. These servers also provide high-availability failover features to ensure that the computing environment continues to operate even when one or more of the servers malfunction or go offline for maintenance. In addition, individual blades are typically hot-swappable, making it easy to swap out a board if one of them fails or requires service.

This approach typically delivers enormous gains. It helps eliminate data silos residing on a haphazard mix of systems and resources. Blade servers that use virtualization can trim basic operating expenses within IT by 5 percent to 15 percent and slash administration time requirements by 50 percent or more. Virtualization also makes it easier for organizations to access data quickly and easily — including regulatory information — and handle disaster recovery more effectively. By maximizing the performance of server-based activities, blade servers create a far more streamlined enterprise.

Finally, organizations using blade servers usually witness a significant gain in data center space requirements. Fewer servers in fewer locations translate directly into reduced real estate costs and energy costs. The end result? When an enterprise adds up all the gains that result from blades, they often see a 40 percent or greater reduction in total cost of ownership over conventional servers.

Sharpening Performance

Not surprisingly, a growing number of vendors are manufacturing blade systems. Leaders include Hewlett-Packard and IBM, which use power-efficient Intel Xeon and AMD Opteron processors in their systems to handle an array of advanced and demanding business tasks. For example, IBM's newest blade, using a 31-watt Xeon processor, taps into visualization techniques to provide high-end imaging for medicine, design, and oil and gas exploration. These blade systems can manage huge data sets required for rendering images, including highly detailed geographic terrain.

In fact, Vasudeva points out, supercomputing applications represent a growing market for clustered blade servers. "Distributed supercomputing is being replaced by systems that are able to spread the tasks among anywhere from 100 to 1,000 blades servers. Organizations adopting this approach are able to achieve huge economies of scale and develop a more cost-efficient computing environment," he says. Meanwhile, vendors are developing more sophisticated blade servers that incorporate greater network intelligence.

Storage is another area that's garnering attention. As the need for more sophisticated backup, data archiving and disaster recovery solutions grows, blades fit perfectly into the picture. Almost all blade servers connect to storage devices using widely adopted protocols such as network attached storage (NAS), or a Fibre Channel or iSCSI storage area network (SAN). In addition to efficiency gains, blade servers can cut cabling costs by more than 80 percent.

Yet, despite all the potential gains, blades present a few challenges. One of the biggest is providing adequate cooling for the densely packed units. Although overall energy costs typically drop with widespread adoption of blade servers, it is essential to keep the units from overheating. In the past, some organizations using blades found themselves only partially filling racks and spacing them farther apart to avoid heat buildup. Today, advanced blade cooling systems are becoming a common feature. Some manufacturers, such as HP and IBM, are building cooling systems directly into specialized blade racks.

Another challenge is connecting various applications and provisioning resources. A few years ago, most enterprise applications weren't designed to work with blade servers. As a result, IT departments found themselves relying on middleware and ingenuity to connect all the components. In addition, some applications required tweaks and adjustments to work within a blade environment which often proved expensive and time consuming. Now, most major software packages accommodate clustering and adapt to a blade environment automatically and on the fly.

Vasudeva uses an iceberg metaphor to highlight the administration and management of blade servers. About 20 percent of the savings — including density, power consumption and cable management — are apparent up front. Less visible are issues centering on hardware, software and network-platform integration; scalability; security and manageability. When a business uses blade servers effectively, these factors can account for a 50 percent savings in operating expenses and capital expenses.

That's a winning approach. Although the conventional server isn't going to disappear anytime soon, it's clear that blades are slicing their way into the computing marketplace in a big way. By 2009, IMEX Research predicts that sales of blade servers will spike to $10 billion — up from about $430 million in 2003. Says Vasudeva: "This is the fastest growing segment of the IT infrastructure industry. It will significantly change the way many organizations manage IT resources and run their business."