The Essential Guide to BLADE SERVERS

By David Chernicoff

Simplifying server management and implementation has been a goal of server vendors for a long time. The cost of setting up new servers, provisioning them, and managing their operation is a significant one, and reducing those costs results in quicker ROI and more easily justifiable initial expenses. Blade server technology is an attractive methodology for addressing these concerns and implementing improvements in your server infrastructure.

Blade Server Basics

Let's take a look at what all blade servers have in common. In the simplest sense, a blade server is a rack-mountable chassis with a backplane that supports some number of server blades, along with a power supply or two. The reality, of course, isn't quite that simple. The enclosure, blades, and interconnects have various parts to play, and despite a drive toward standardized components, carefully matching the hardware components with the software tools necessary to manage the servers is crucial to the successful adoption of blade server technology in your enterprise. Even power is modularized, with dedicated power enclosures supporting multiple redundant power supplies and powering an entire rack of blade servers.

The Essential Guide

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As a blade server customer, you'll rely on the vendor to have built a product that meets the needs of your networking infrastructure. Given their configurability, blade server components need to be well integrated, so that all combinations of blades perform equally well in their appropriate environments.

Blade Server Chassis

The blade server chassis, or enclosure, is the heart of the blade server environment. A good enclosure will support features such as high availability, management, simplified wiring, and the ability to run a mix-and-match set of components and operating systems.

High availability. At the enclosure level, high availability means that the enclosure supports features that ensure a high-availability environment. These features include redundant power supplies, with each power supply capable of supporting a fully configured chassis; hot-swappable backplane functionality, with the backplane capable of supporting the live swapping of server blades, network blades, and interconnect blades without affecting the operation of other components running in the enclosure; and isolation of each slot in the backplane so that a hardware failure on one card doesn't fry the entire chassis.

Management. At the chassis level, "management" defines which features are available without the installation of a dedicated management blade. Such features can include reporting on basic chassis functions, monitoring chassis-to-chassis interconnects, and identifying installed devices.

Simplified wiring. Because the use of blade servers reduces the wiring normally associated with installing servers by about 80 percent, the blade server chassis combines functions that server cabling would typically handle. Also, given the nature of server blades, cabling usually needs to be installed only once; after the blades are installed, the appropriate software controls their use, not by physical interaction with the hardware.

Chassis Blades

Blades generally fall into two categories: server blades and interconnects. Each chassis accommodates a certain number of blades, and you usually are not limited to installing a specific number of any blade type. Blades generally fall into two categories: server blades and interconnects. There usually is no limit to the specific type of blade you can install. The logical number of each type of blade you install per

chassis is defined by the applications and environment that you plan to support.

Server blades. Although the "server-on-a-card" concept is not new, the capabilities of the current generation of server blades far exceed earlier expectations for the technology. Server blades' current functionality includes the ability of blades to work together to build clustered systems and consolidate servers.

Today, server blades are commonly available in single-CPU, 2-way, and 4-way configurations. Each blade has its own dedicated memory, storage connection, and network connection. You can fill a chassis with any combination of server-blade types.

Vendors offer blades configured with low-end and high-end processors, and the intended usage of the chassis dictates the appropriate blade configuration. For example, a single chassis used as part of a Web server farm might best be configured with as many single mid-range CPU blades as possible because the load will be balanced across all of the blades serving Web pages in the farm. Losing one blade will have minimal impact on the Web farm's performance, and the easy hot-swappability of the blades makes replacing the dead blade a minor inconvenience and not a crisis.

Blades with multiple CPUs would be more appropriate for computing-intensive scenarios. The use of such blades must be balanced against the cost of a single blade in the configuration and whether the additional CPU power is a necessity. A blade with two cutting-edge processors can cost as much as 10 times more than that of the blade that's

suitable for Web serving. The additional cost isn't just for the processor alone. High-end blades have additional memory, along with higher-performance storage and networking capability. Keep in mind that high-performance blades can have a larger footprint than entry-level blades, requiring more space in the chassis and limiting the number of blade servers you can install in one chassis or rack.

The introduction in 2005 of dual-core processors from AMD and, later, by Intel, will effectively double the CPU power available to blade servers at only an incremental increase in cost. This means that even entry-level blades can have the effective performance of today's low- to midlevel 2-way blades. The modular nature of blade servers guarantees that users will be able to upgrade to these dual-core technologies when they're available without negatively affecting blade server–based infrastructures.

Blade servers are a natural fit with the storage networking model—both the traditional Storage Area Network (SAN) Fibre Channel configuration and iSCSI –based storage. Many server blades offer direct Fibre Channel support and provide the appropriate host bus adapter (HBA) for connection to a SAN. Both Network Attached Storage (NAS) and SAN configurations make sense in the blade server world because a clear limitation exists to the amount of storage that can be directly attached to each blade server. The flexibility that the combined blade server/NAS/SAN configuration offers is limited only by the imagination of a network's designer and the amount of money the enterprise dedicates to the project.

Interconnect Blades. Interconnect blades are units that collect networking traffic from the installed server blades. Basic interconnects aggregate all of the network connection that each server blade offers. Many offer both copper and fiber support, and support for 1000Base-T is the norm.

Interconnects with full gigabit Ethernet switching capabilities are available with support for as many as 12 gigabit Ethernet connections. Patch-panel interconnects are also available, so that small networks can be built on a single chassis. Of course, the ability to pass through to additional enclosures is a key element in building large blade server environments, and this capability can be found most vendors' interconnects.

Interconnects can be hot-swappable. Keep in mind that the connections that interconnects maintain are physically broken when the cables connecting the interconnects to the outside world are swapped to the replacement blade.

Many high-end interconnects offer the same features you find in high-end network switches. For example, one such feature is the ability to build Virtual LANs (VLANs) and detailed port control for network-attached devices.

Managing Blade Servers

Although management is an important component of any networking environment, its importance is magnified in the blade server world. Managing blade servers requires a console tool that can manage the individual servers as well as all interconnected components, the chassis, power supplies, and attached storage components.

Consider that you'll need a detailed hardware management tool specifically designed for the particular requirements of blade servers. The ability to prefail (i.e., to determine when a component is likely to fail, so that it can be replaced before an actual failure) components so that the benefits of the hot-swappable blades can be fully realized is one small part of the management process. Detailed performance analysis, bottleneck reporting, troubleshooting, and proactive problem resolution techniques should all be part of the basic blade server management package.

Because blade servers combine networking in the same chassis, all the features you'd expect a network management package to provide should be part of your blade server management toolkit. Networking is tightly integrated into the nature of a blade server, which means that you'll want a blade server vendor that offers you a well-integrated network management tool along with the basic blade-management package.

Management should also extend to other components in the blade server rack: for example, storage, power, and additional networking components. One console should provide all management information to the administrator, as well as interpretations of the reported data that are specific to the blade server environment.

Don't forget about the provisioning aspects of your management tools. A blade server is fundamentally a lights-out environment: headless servers, few consoles, in-and-out-of-band management. Provisioning the servers is a big part of an administrator's responsibilities. He or she will need tools at hand to configure the servers, apply patch-

es, install applications, configure virtual networks, and back up and restore configuration information in the event of hardware failures.

To all this add integration with your existing server and network management tools. Integrating a blade server environment with your existing infrastructure will be much simpler if you can use the same set of tools (with added components) to manage the requirements of your entire networking and storage infrastructure.

The Future Is Now

Blade server technologies have obvious application today, especially with the growth of grid- and utility-computing business models, and have potential to be the future of server computing. Easy virtualizations, reduced infrastructure costs, and simplified management place blade server technologies high on the list of innovative new technologies to which businesses are paying close attention. The easy integration of blade server technologies with cutting-edge storage and networking technology will speed the adoption of all related technologies. When support for SANs, or iSCSI, or Gigabit Ethernet becomes a standard part of the server product set, the adoption of those related technologies becomes much simpler for the business enterprise. Blade servers today give you the option of providing a bit of "future-proofing" for your server environment.

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