MAKING SERVER **CONSOLIDATION** A REALITY

As e-business, enterprise portals, data warehouses and enterprise systems have grown in size and importance, so has the challenge of managing data and ensuring that it is used optimally. Today, it is not unusual for organizations to find themselves sinking under the weight of managing unwieldy systems containing a seemingly endless number of files.

Often, when an enterprise runs out of servers or storage space, it simply piles more on. Although this approach mitigates the immediate crisis, over time it creates a rash of other problems, including hard-to-find data, inefficient use of resources, higher operational and information technology costs, and additional site licenses to administer. At some point, customers, business partners and employees feel the impact, and the organization finds itself facing lagging productivity and performance.

Now, more than ever, it is essential to get the most from all IT systems and to help ensure that an entire enterprise infrastructure is operating at its full potential. In many cases, organizations can reallocate servers, storage and other resources to gain far-reaching efficiencies and reduce expenses. When an enterprise eliminates "server sprawl" and brings order to the chaos of an unmanaged or under-managed IT infrastructure, it can turn leaden performance to gold.

One way to win performance gold is through server consolidation. Server consolidation is a strategy for reducing costs and improving control of the IT infrastructure. Companies may achieve this by reducing the number of data centers, standardizing systems management procedures and reducing the number of physical servers that exist in their environment.

By optimizing data centers along with the underlying IT infrastructure, organizations can deliver better performance and service levels while lowering costs. The more efficient use of resources can deliver a higher return on assets (ROA), a lower total cost of ownership (TCO) and a streamlined IT environment that lets staff focus on strategic rather than administrative challenges. An effective consolidation initiative also can slash systems maintenance and cooling costs, reduce license fees, simplify security, boost availability, and improve backups and data recovery.

In an era of tight budgets and demanding performance pressures, server consolidation is all about dollars and sense. Too often, IT resources in an enterprise are either underutilized, overtaxed or both—systems do not manage the workload effectively, and highly distributed servers must support new applications along with an ever-growing volume of data. At some point, it becomes next to impossible to take system and organizational performance to the desired level. People and systems become bogged down.

Consolidation simplifies management of heterogeneous hardware and software. When it is put to effective use—through an open architecture, virtualization strategies and other solutions—it can boost performance and transform an enterprise. Server consolidation can pay dividends across a wide range of industries, from manufacturing to professional services. It can help decrease, if not eliminate, many of the headaches that come with a highly fragmented IT environment.

In recent years, a growing number of organizations have turned to server consolidation. By migrating widely dispersed servers to fewer locations, using existing servers more efficiently, upgrading to more powerful servers, standardizing on fewer applications and operating systems, centralizing data management, and consolidating applications and operating systems, they are able to better deliver on the promise of today's IT.

Beyond Computing

The rapid and widespread adoption of enterprise computing has forever altered the nature of business. But behind the glitzy façade of today's digital economy lies a sobering truth: Managing of systems has become a key to success. Organizations that knit together all the disparate pieces of their IT infrastructure can gain a decisive competitive advantage. They are poised to leverage the full power of their digital capital.

ADVANTAGE: AMD OPTERON™ PROCESSOR

The AMD Opteron™ processor offers distinct advantages for server consolidation efforts. These include:

- **Lower power and cooling costs** for the data center
- **High-density platforms** provide more compute performance per amount of power and space used 32-bit and 64-bit capable so both types of applications can be mixed and matched on the same AMD-based platform
- **More virtual machines per physical server** thanks to AMD Direct Connect Architecture's efficient handling of the high memory and I/O needs of virtualization software

However, the day-to-day demands of running a business often edge out methodical planning. The need to keep line-of-business applications, databases and Web-based services operating at full throttle often results in reaching for the fastest solution: quickly adding systems to gain raw processing power. The resulting array of servers and the bottlenecks that inevitably result slowly and inexorably take a toll. In some organizations, 80 percent of IT spending goes toward server management. Market research and consulting firm International Data Corp. estimates that servers often operate at less than 20 percent of their processing capacity.

Organizations that have a less than optimal server infrastructure often find themselves caught in a downward spiral. The crises put them in a constant firefighting mode, in which they solve an immediate crisis, but in so doing exacerbate their overall problems and accelerate the downward spiral. They add servers at a rate faster than the corresponding growth in business activity warrants, and add multiple servers for each new application. This leads to marked server utilization imbalances. The enterprise must run multiple infrastructure servers for the same applications; performance and service levels deteriorate; and ever more time-consuming administrative tasks fall to the IT department, leaving even less time for planning.

Not surprisingly, the topic is garnering a growing amount of attention. According to IT consultancy Gartner Inc., more than two-thirds of companies in North America and Europe had begun to use consolidation strategies in 2002 (compared to less than one-third in 1998), and 25 percent were considering turning to consolidation during the next few years. Many of these companies are targeting messaging, database, Web and print servers for their initial consolidation efforts.

In addition to needing better data management techniques, many organizations also are grappling with governance and regulatory issues. Strict reporting rules and tight internal controls mandated by the Sarbanes-Oxley Act of 2002, the international financial guidelines known as Basel II, and the Health Insurance Portability and Accountability Act of 1996 have created a need for more centralized administration and tighter internal controls.

Today, business decision-makers are focusing on three core goals:

1. **Lower costs.** The higher density of today's systems—particularly blade servers and small form-factor, or dense,rack servers—has a marked effect on power consumption and cooling costs. Unfortunately, these expenses are often viewed by management as a fixed cost. However, a well-designed infrastructure that relies on more efficient processors, such as the AMD Opteron™ processor, can help pull the plug on power problems. AMD uses a superior silicon on insulator micro-architecture to deliver higher performance at lower thermal output levels.

   The cooler-running AMD Opteron processor also makes it possible to increase the density of the servers per rack,avoiding the need to increase a facility's physical space and making better use of existing space. Thanks to the high levels of performance delivered by the AMD Opteron processor, companies have found that a two-way AMD Opteron processor-based server may indeed outperform some four-way boxes. Thus, a substantial savings in software licensing fees, based on per-processor licenses, may be realized.

2. **Bolster reliability.** By ratcheting up availability and building better backup and disaster recovery systems, an enterprise can realize significant gains. Reducing system downtime can diminish financial risks while providing the service levels that customers, business partners and employees expect. This can translate into greater bottom line profits. At the same time, an organization can boost its level of security and protection.

3. **Improve flexibility, scalability and agility.** With the right systems in place, an organization can act—and react—to changing business conditions more nimbly than ever before. A well-designed IT infrastructure that deploys servers efficiently can build a foundation for present-day performance and future growth. It's possible to access information more quickly and deploy new systems in a more strategic manner.

The contrast between organizations that use consolidation effectively and those that do not is often profound. Server utilization rates may rise from as low as 5 percent to as high as 60 percent. At the same time, organizations may save millions of dollars in IT costs. It's not going too far to say that in today's high-stakes business environment, an effective server consolidation strategy can determine the success of an enterprise.

Putting Processing Power to Work

Tremendous opportunities exist to build consolidated data centers and more efficient server strategies. However, to achieve results, an organization must drive performance gains with the right underlying architecture and systems. This requires business decision-makers to develop a highly focused and comprehensive strategy.

TOP 5 BENEFITS OF USING THE AMD OPTERON™ PROCESSOR FOR SERVER CONSOLIDATION

1. Cost savings
2. Greater control and manageability
3. Improved service levels
4. Higher operational efficiencies
5. Enhanced availability of systems and services.

A key factor is developing an environment that taps into the power of advanced technology. High-performance processors capable of managing memory and fast data I/O enrich an IT environment and make it more robust. Systems that offer sophisticated virtualization capabilities can help an organization maximize the potential of its server-based applications and computing resources. Virtualization technology partitions a computer into several independent machines that can support different operating systems ("guests") and applications concurrently. It allows for more efficient utilization of resources through server consolidation.

AMD64 processors provide the technical underpinning for a successful server consolidation initiative. The AMD Opteron processor is a high-performance x86 processor designed for enterprise servers and workstations. Its Direct Connect Architecture directly connects the CPU to the memory, I/O and other processors. The integrated memory controller provides high-speed, low-latency access to memory that results in increased efficiency of host and guest operating systems.

AMD Opteron processor technology also helps to decrease platform power consumption, create a cooler data center, better leverage the existing power infrastructure and more efficiently use server and storage space. Ultimately, this reduces—and sometimes eliminates—the need for ongoing facility expansion and upgrades.

Another powerful tool is AMD's HyperTransport™ technology, which multiplies the benefits of virtualization by providing improved scalability and I/O capabilities. This translates directly into support for more guest OS sessions and/or more user access applications. Because AMD64 extends the x86 instruction set while retaining compatibility with 32-bit x86 software, an enterprise can combine legacy operating systems and applications with leading-edge software and tools.

Next-generation technology from AMD will further advance virtualization by emulating multiple independent execution machines on a single system. This feature will ratchet up system performance and boost the overall return on investment. And because AMD has forged strong relationships with leading hardware and software makers, including EMC Corp., Hewlett-Packard Co., IBM Corp., Sun Microsystems, Inc., and VERITAS Software Corp., these powerful solutions will work with a wide range of systems.

When organizations adopt the right approach, the results can be impressive. One Standard and Poor's 500 company with a strong Web retailing presence found itself hitting the upper limits of memory and CPU cycles during busy periods. As performance slowed, concern about customer satisfaction grew. The company eventually opted to replace some aging servers with HP servers that use the AMD Opteron processor. These HP servers, running Linux, broke through past performance barriers and catapulted the company to a new level of service. Customer satisfaction rates climbed as performance improved. Today, the AMD Opteron processor-based server farm handles 50 percent of the transactions previously handled by a mainframe—and at a fraction of the cost.

Such returns are increasingly common. One major financial institution found that by switching to 64-bit AMD Opteron processor-based servers, it could achieve substantial performance gains without recompiling any code or making any physical changes to servers residing on its network. Previously, 32-bit servers provided an addressable memory limit of 4GB of physical and virtual memory—with the operating system alone requiring IGB. The AMD Opteron processor-based servers return IGB of application-addressable virtual memory.

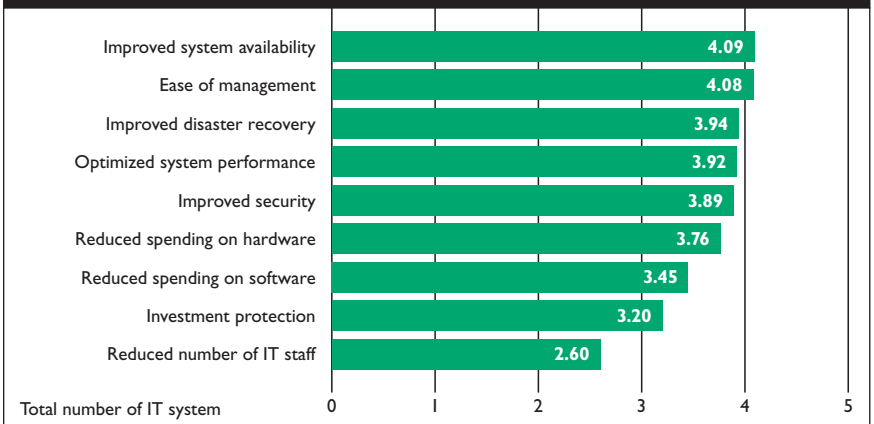
The story is much the same across a wide range of industries. With the right solutions in place, an enterprise can turbocharge server performance and achieve far greater efficiency than anyone could have imagined only a few years ago.

Building a Roadmap for Success

An effective consolidation strategy doesn't merely reduce the number of physical servers within an enterprise. It also

creates an environment that makes the most efficient use of all servers. When an organization maximizes server capacity, numerous benefits follow. Instead of achieving minimal gains from buying less equipment, an enterprise can reap the huge benefits that come with a well-planned infrastructure. Suddenly, it is possible to meet performance goals and manage growth. Dealing with major events such as mergers and acquisitions also is greatly simplified.

Server Consolidation Drivers



Total number of IT system management respondents: 397
Source: IDC, 2004

Organizations achieve success with consolidation usually by approaching the task in a highly structured manner. They deploy a cross-functional team that can analyze the needs and opportunities within the organization's departments and constituencies. Savvy managers look first for the biggest consolidation opportunities, particularly in messaging, file and print sharing, databases and domain servers.

To achieve success with a server consolidation initiative, an enterprise must understand its business requirements; conduct the analysis necessary to create a plan, including identifying gaps and opportunities; develop a strategy for moving a consolidation plan forward, including how to centralize and consolidate servers, operating systems and IT staff; put in place the technology and applications in support of the plan; and then deploy the project throughout the enterprise.

A successful consolidation strategy focuses both on technology and business processes. The right hardware and systems create the opportunity for gains; a well-defined plan ensures that the organization realizes the promise of the technology and achieves a solid ROI. Like any major initiative, server consolidation is not painless, but the payback from designing a more efficient enterprise computing infrastructure is significant.

Once an organization eliminates under-utilized assets, server and storage sprawl, and the array of problems that ripple out from an unwieldy and unpredictable data environment, it can take its data center and enterprise computing infrastructure to a higher level. By creating a utility computing environment—one in which information flows like water or electricity at the turn of a handle or flip of a switch, and that adapts at a moment's notice—an organization can finally reap the full rewards of the Information Age.

AMD is driving this evolution in computing. As organizations look to build a robust and sophisticated IT infrastructure that serves as the foundation for a knowledge-based enterprise, they depend on consolidation to deliver results. By turning to the next generation of highly efficient servers, they are able to build a more reliable, available and cost-effective data infrastructure. Technologies such as the AMD Opteron processor and AMD64 are ushering in a new era of highly efficient servers. They are leading the enterprise to a bold new frontier of information technology.