

## AMD64 Technology: Providing Processor-level Value for Today's Varied Storage Needs

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### EXECUTIVE SUMMARY

Storage has become a multi-billion dollar business, growing in double digit values every year. Virtually every computer user, from scientists running complex models on High Performance Computing clusters to enterprises and small businesses to consumers in the home, finding adequate storage solutions for reams of data is a growing priority. Today's storage vendors are racing to address this opportunity and are increasingly looking at the processor level to differentiate their systems and provide the appropriate level of performance for their customers. Emerging needs include extreme performance and system longevity, more cost-effective solutions, and extensive and varied software and support. The AMD Opteron™ processor family, along with other AMD64 technology-based processors, satisfies these demands in ways that allow storage vendors to achieve new levels of product performance while speeding time-to-market. This paper discusses specific features and benefits of AMD64 technology that storage vendors are incorporating into their solutions and how they uniquely address the variety of customer needs in today's storage market.

### TODAY'S STORAGE CHALLENGE

Storage is a booming market. According to a study of 100 CIOs conducted by Merrill Lynch for the period 2005-2007, enterprise storage spending is growing 11 percent per year. Storage growth is outpacing spending on both servers and PCs by more than six percent. In fact, storage spending is outpacing all other major IT budget categories. IDC, a leading information technology research firm, stated in its May 2006 forecast for disk storage systems that networked storage capacity purchased by organizations will increase at a compound annual growth rate of 63% between 2005 and 2010.\*

For storage system vendors, this increased capacity demand and spending is a huge opportunity. But for those requiring additional storage, the increased demand can present IT challenges in what types of storage is needed and how to plan for future expansion. Storage system vendors now have an opportunity to differentiate their products to address a growing variety of customer requirements. Those customers in turn have access to more types of storage systems to address their business challenges. Increasingly, the processor used in a storage system can help provide this differentiation and can help vendors provide better solutions for their customers.

Storage systems today fall into three broad categories:

**Monolithic storage.** For IDC, storage systems that cost more than \$150,000 are the lifeblood of large businesses or institutions.\* Most large entities could not operate without a tried and true method of storing mission-critical data, using either storage systems attached to Storage Area Networks (SANs) or Network Attached Storage (NAS) systems. These types of systems are often called monolithic storage systems and deliver high performance and reliability to support mission critical applications. Because of the importance of these systems to fundamental operations, customers demand uncompromising levels of performance, reliability, fault tolerance, connectivity, and vendor support.

**Modular storage.** Another critical and growing class of storage tracked by IDC is systems that sell for \$15,000 to \$150,000. According to IDC, these systems represent the largest and fastest growing set of storage systems shipped today.\* It is in this class of storage systems where manufacturers are incorporating low cost/high capacity disk technologies to support disk-based back-up and long term active data archiving. Modular storage is used in both large enterprises and small to medium-sized businesses for everything from email to databases and customer files. They are often called second tier or near-line storage as well.

**Specialty storage.** Also called “server-like” storage, companies buy specialized storage systems or appliances for specific applications or to address a unique scenario. This can include medical records archiving, Sarbanes Oxley compliance, simple back up of other storage systems, remote office data management, etc. These specialized systems offer unique value to companies and often require more customized software applications, but at the same time, must compete with general-purpose solutions in price/performance.

	<i>Monolithic Storage</i>	<i>Modular Storage</i>	<i>Specialty Storage</i>	<i>AMD64 Answer</i>
<i>Connectivity and Bandwidth</i>	Maximum possible	High and growing	Specialized	AMD64 technology offers maximum possible system bandwidth via an integrated memory controller and HyperTransport™ technology
<i>Pervasive Software Support</i>	Extremely diverse	Industry standards	Specialized	Complete range of x86 OSs, applications, and platform from which to develop custom solutions
<i>Power Management</i>	Critical	Increasingly important	Specialized	AMD PowerNow™ technology and industry-leading x86 performance-per-watt
<i>CPU Performance</i>	Maximum possible	High	High	Industry-leading x86 performance-per-watt. Native 64-bit application support and native multi-core architecture for future-proof performance and scalability
<i>CPU Lifecycle</i>	5+ years	3+ years	1-3 years	AMD64 Longevity Program offers 5+2 years availability

**Monolithic storage demands extreme performance and reliability.** With lifetimes of five to ten years or more, these mission-critical storage systems need an underlying architecture that is stable, high-performing and simple to manage throughout those lifetimes. Further, these systems require processors that don't impose arbitrary limitations on memory or bandwidth. In short, they require both maximum performance and maximum flexibility from the processors chosen.

**Modular storage requires maximum efficiency.** With nearly every major computer vendor offering some form of a modular storage solution for businesses, differentiation is a key to winning customers, while a wider variety of available systems allows customers to make the best possible choice for their storage strategy. This category requires high performance at the lowest total cost (both purchase and ownership), the ability to incorporate unique features, and extensive industry-standard software support.

**Specialty storage demands flexibility.** Specialty storage requires custom designs and software that optimize specific aspects of storage. Because these requirements vary based on application and/or end customer, these systems need a remarkably flexible and readily supported platform.

### AMD64 SOLUTIONS FOR STORAGE

Many designers know AMD from its industry leading advances in microprocessing. What many are learning now is the degree to which AMD64 solutions are particularly good fits

for storage systems. This is a natural result of AMD's customer focus and its commitment to providing efficiency and performance for the data center. Specific features of AMD's product line that support storage systems include:

**AMD64 technology with Direct Connect Architecture:** Provides native **32- and 64-bit computing** with no degradation in performance. Direct Connect Architecture eliminates the bottlenecks inherent in legacy front-side bus systems by connecting processors, the memory controller and I/O directly to the CPU. Direct Connect Architecture features an **integrated memory controller**, which optimizes memory bandwidth and allows access to main memory at processor speed, unhampered by an external front side bus. AMD's memory bandwidth scales with the number of processors, compared to legacy designs that scale poorly because access to main memory is limited by external Northbridge chips. HyperTransport™ technology provides a **highly scalable, high bandwidth interconnect** between computing cores, I/O subsystems, and other chipsets. AMD Opteron processors support up to three coherent HyperTransport links, yielding up to 24.0 GB/s peak bandwidth per processor.

**Leading Performance-per-Watt:** AMD leads the industry in providing the most computational power with the lowest amount of energy consumed, resulting in a more efficient data center with **lowered operating costs**. As storage demands add to the already growing power requirements of the data center and because storage systems have long life once in place, power management is likely to become a growing purchase consideration.

**Scalability:** AMD's unique processor architecture takes away the front side bus bottleneck and allows up to 8 processors in a single computing system to be directly connected and provide remarkable efficiency. In addition, AMD64 technology was designed from the ground up to be **multi-core** capable, giving data center system designers the opportunity to pack maximum performance into a **dense server configuration**, without the need for extensive infrastructure changes.

**AMD64 Longevity Program:** The stable and reliable AMD64 platform with Direct Connect Architecture is offered with an **extended standard availability** period of five years for a select set of the AMD Opteron processor family. This provides storage customers an unparalleled choice in advanced processor architecture with the component longevity this market often requires.

**An industry standard platform:** AMD64 technology is based on the industry-standard x86 platform and readily supports the **existing library of software** and development tools used in the storage market today. Storage vendors can employ server packages such as Microsoft® Windows® Storage Server 2003 or exploit the development power of open source software suites such as Linux® or Eclipse. Additionally, leading storage OEMs are increasingly featuring their own **custom software solutions** based on x86 and are discovering the **application performance** of AMD64 technology.

## CONCLUSION

The benefits AMD64 technology can be implemented by storage providers to both differentiate their products and better address customer needs. AMD's range of 64-bit processor solutions addresses the varying needs of monolithic storage, modular storage, and specialty storage systems. Regardless of whether designers are optimizing for extreme performance, price/performance, design flexibility, customization, or a combination thereof, AMD64 processors give vendors new options for satisfying the broad range of storage customers.

\*IDC Study: Worldwide Disk Storage Systems 2006-2010 Forecast and Analysis: Expansion, Efficiency, and Economics Driving Growth May 2006 Doc #201596



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