

The Growing Need For I/O Performance

Why Sustainable I/O Performance is Vital to Supporting Key Initiatives From Server Virtualization to New Application Rollouts

A research report presented by TheInfoPro™ and Gear6

THEINFOPRO
The Voice of the Customer



- > Gear6 accelerates storage and delivers real time application performance with centralized storage caching. Deployed in the data center, Gear6 scalable caching appliances provide scalable and transparent acceleration for existing storage infrastructures to speed up applications, eliminate peak load disruptions, and simplify enterprise configurations.

INTRODUCTION

Increasing demands for new applications and optimal performance are creating an unmanageable mess of server proliferation and spiraling storage infrastructure. To address these data center pain points, companies have focused their server and storage priorities on reducing costs and facilitating easier system management.

In combating server sprawl, companies rank consolidation through virtualization as a top priority. But questions still remain as to the performance of this virtualized infrastructure.

To better accommodate storage growth, consolidation also tops the priority list. Tiered storage build-out ranks second for both cost-optimization and space management. But as with server virtualization, improved performance remains critically important in storage.

To place these trends and market needs in context, Gear6 partnered with TheInfoPro, an independent research network and leading supplier of market intelligence for the Information Technology (IT) industry. The result is a data-driven analysis of the performance needs for effective and efficient server and storage pairings in enterprise environments.

DRIVERS OF STORAGE AND SERVER GROWTH

47% of Fortune 1000 companies rank business expansion, primarily driven by new applications as the number one reason for network storage growth.

Across all major industries, the increasing adoption of new enterprise applications puts continuous pressure on the underlying technology infrastructure. Each new application such as a compliance or business intelligence tool, or simply a new database, impacts both the server and storage components.

On the storage side, new application deployment ranks as the most significant driver of network storage growth. This is exacerbated by the fact that when deploying new applications, application managers often request more storage than is initially required. Even today the pain of expanding storage can be so difficult, that managers try to provision as much as possible up front, resulting in gross over-provisioning. Other factors contributing to network storage expansion include growth in databases, data warehouses, and application data sets.¹

The end result of this excessive expansion is that **storage growth ranks as the number one pain point for storage professionals.**²

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Users cite server sprawl and environmental constraints (power, space, and cooling) as two of the top three server pain points.

RESULTING SERVER AND STORAGE PRIORITIES

Similarly, new application growth fuels deployment of an increasing number of servers, as administrators are often left with new physical server installation as the quickest way to accommodate these workloads.

This server sprawl negatively impacts data centers as the increase in power, space, and cooling requirements adds to the overall installation burden beyond just managing an ever-increasing number of servers.³

Addressing the rampant growth of servers and storage, companies identify the following top initiatives in each category.

Top Server Priorities⁴

1. Consolidation
2. Virtualization
3. Technology refresh

Top Storage Priorities⁵

1. Consolidation
2. Tiered build out
3. Technology refresh

To control server sprawl, IT administrators cite consolidation as the most important program, aiming to reduce the number of servers under management. Virtualization is generally viewed as the best means of tackling this challenge, so we see the first two responses tied closely together. Technology refreshes rank third, as administrators upgrade platforms to consolidate more virtual machines on fewer physical machines.

“Virtualization environment build-out is also causing [storage] growth after our new applications”

— User comment, Financial Services

Storage priorities overlap significantly with the server side. Customers are looking to consolidate storage platforms, driven by the need to reduce management as well as environmental overhead. And technology refresh ranks high in the list, usually instigated by expanding capacity requirements, higher performance requirements, and the opportunity to upgrade during new application deployment cycles.

Tiered storage build out is the unique priority for storage. Customers assign this a high ranking primarily for cost optimization. The main goal is to free

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capacity on high performance, lower capacity systems by migrating less critical data to high capacity, lower performance systems.

USER CONCERNS AND DESIRED IMPROVEMENTS

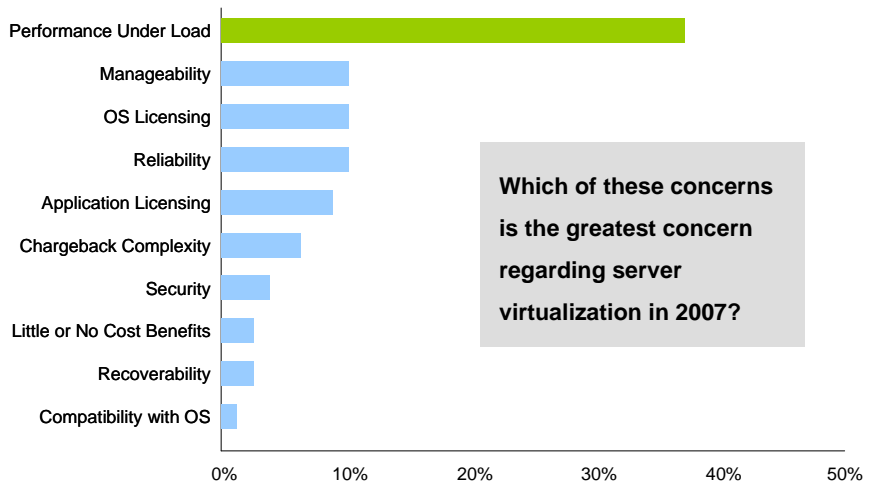
Customers see "Performance under Load" as the number one virtualization concern in 2007.

While customers maintain clear preferences for undertaking certain initiatives, they also harbor trepidation about maintaining sufficient performance during these transitions. Both server and storage projects can be held up or postponed due to these apprehensions.

VIRTUALIZATION CONCERNS

When considering server virtualization, customers are most concerned with performance under load, with almost 40% citing this as the number one concern. Manageability and licensing concerns ranked 2nd and 3rd.⁶

Further, when determining which applications to deploy on a given server, customers ranked **Performance / Utilization**, as the number one criteria.⁷



Which of these concerns is the greatest concern regarding server virtualization in 2007?



TheInfoPro Server Study Wave 5 (7/23/07); 2007 n=78

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Figure 1: Virtualization Concerns - Results from TheInfoPro Server Study, Wave 5

" Performance worries us because [certain] high transaction servers don't currently virtualize well."

— User comment, Consumer Goods / Retail

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So while virtualization ranks as one of the most critical short term and long term projects for data center managers, the concern over performance ramifications must be addressed.

STORAGE CONCERNS

As with server virtualization, storage customers remain focused on performance. In response to a question on most needed storage service improvements, Performance ranked just behind Price and Availability as a desired enhancement.⁸ Also, the subsequent two responses focus indirectly on Performance: Meeting Service Level Agreements (SLAs) for Provisioning depends on the ability to deliver capacity and sufficient I/O, and Speed of Delivery relates to how quickly capacity and I/O are made available.

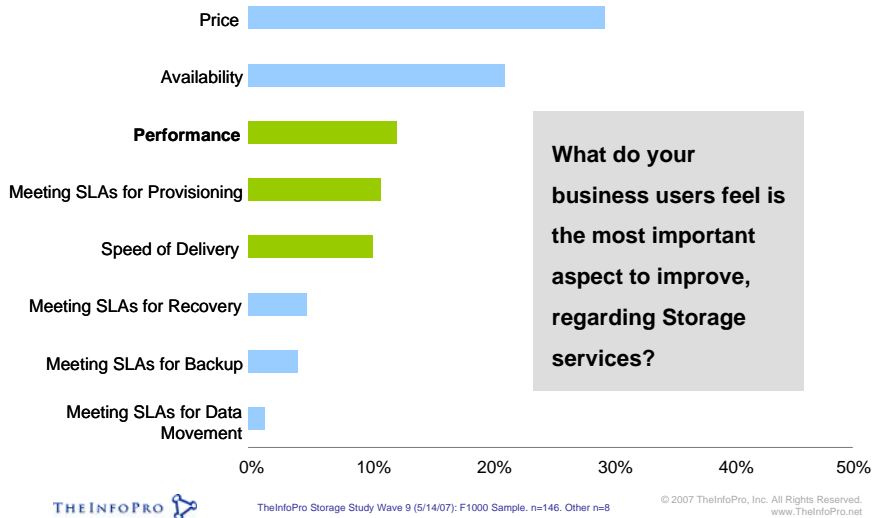


Figure 2: Needed Storage Service Improvements - Results from TheInfoPro Storage Study, Wave 9

The distance between application and data storage groups at large companies can cause highly variable workloads within an organization. New applications deployment increases I/O patterns that directly impact performance of existing storage systems which may be currently serving existing users and applications.

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“ ...sometimes user areas come up with requests we did not know even existed. Application planning is the issue — we don’t know what application groups want to do. For example, they can bring in new applications and themselves, and then tell us they need a new database.”

— User comment, Industrial / Manufacturing

Over 40% of Fortune 1000 companies responding experience application brownouts once a month.

In part due to insufficient performance where storage systems cannot serve enough data quickly to data-hungry application servers, many customers experience application brownouts. This often results from application upgrades that change the workload profile and create new data hotspots. The frequency ranges, but almost 20% of Fortune 1000 companies experience an application brownout twice a month, and over 40% once a month.⁹

Additional storage concerns center on the dollars and time spent on technology refreshes, tiered storage build outs, and data migrations. These three items ranked as the top budget initiatives for storage managers in 2007.¹⁰ It is important to remember that these projects aim to reduce costs, but also make room for data sets that require the highest performance. Specifically, migrating or tiering storage is as much about finding cost-efficient space for less critical data as it is about reclaiming fast (and expensive) space for performance-intensive applications. With 24% of Fortune 1000 companies reporting that they complete 10 or more complete system migrations a year, anything to reduce this need will benefit data center managers.¹¹ As coordinating outage time with users is the biggest pain of migrations, reducing the number of migrations boosts overall productivity.¹²

Storage Security is another area where the performance impact ranks high, with 35% citing performance as the top security pain point. Specifically users securing storage through encryption have the most difficulty in maintaining adequate performance.¹³

So while customers stretch to add more functionality to their network storage infrastructure, performance considerations permeate most initiatives.

SERVER AND STORAGE TRENDS IMPACTING I/O

NAS ranks highest as Fortune 1000 customers' anticipate it will grow at 41%.

One of the strongest trends driving change in enterprise environments is the increase in data sharing. Sometimes referred to as Shared I/O, the workloads captured under this moniker typically come from clustered or distributed applications where multiple clients are accessing the same data set. Similarly more and more enterprise applications provide a larger user base with access to a single data repository, sharing the I/O load. Business intelligence fits squarely in this category.

With its strong foundation for enabling data sharing, network attached storage (NAS) has risen to fill enterprise needs of these new workloads. TheInfoPro forecasts growth across all storage segments, but at 41% NAS ranks highest in terms of Fortune 1000 customers' anticipated growth.¹⁴ Within industry sectors, financial services reports the greatest increase in NAS deployment, anticipating over 50% growth for 2007.¹⁵

Increasing NAS adoption is a result of greater data sharing, as well as regulatory and compliance archiving, placement of virtual machine disks on file systems, and expansion of multimedia content.

Coupled with NAS adoption, clustered file system implementations are increasing with over 50% of Fortune 1000 companies reporting deployment.¹⁶ The increase reflects a growing desire to consolidate multiple systems into a single manageable entity.

Of course, once consolidated into a single entity, customers still strive to optimize performance. When asked about next generation storage array functionality, the top response was the "migration capability to change the underlying data layout based on historical performance data."¹⁷ Essentially, customers are striving for ways to place frequently accessed data in a higher-performance storage category, and less frequently accessed data in a lower-performance category.

CONCLUSIONS

Server and storage administrators set their near term initiatives based on the greatest pain points. The data collected by TheInfoPro presented in this paper clearly demonstrates a need for sustainable I/O performance to alleviate key pain points and put data center managers in a strong position for the future.

From a server virtualization perspective, IT managers deploying virtual machines need the reassurance that the underlying storage systems can

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maintain peak performance in the face of increasing loads. Beyond just scaling storage capacity to meet the needs of virtual machines, customers need a way to deliver enough I/O to satiate data hungry applications. This will remove the variability concerns from server virtualization.

“ So far, we’ve been very happy with the shift to virtualization of smaller platforms. The advent of quad-cores will cause I/O bottlenecks, and that will drive us to use smaller systems”

— User comment, Financial Services

Today, customers cite cost savings and consolidation as the primary virtualization benefits. But looking forward, 30% of customers cite dynamic provisioning as the most important application benefit by 2010.¹⁸ The ability to dynamically place application workloads will entail an even greater need for sustainable I/O performance.

On the storage front, consolidation implies a footprint reduction while still handling the same or greater workloads. Clearly, performance will play a critical role. Similarly, a significant portion of tiered storage build outs and data migration activity focuses on freeing up high-performance storage for business critical applications. The ability to add performance without requiring tiering or migrations will save customers time and money.

Historically, customers have had to acquire both I/O performance and I/O capacity in the same storage system. But the availability of products such as scalable caching appliances from Gear6 offers customers new choices for delivering I/O with their existing infrastructure, relieving storage systems from hot spots and allowing servers to reach maximum utilization by avoiding contention. Companies and customers facing performance challenges due to server virtualization or storage consolidation now have a clear and navigable path to sustainable I/O performance.

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About TheInfoPro

TheInfoPro (TIP) is the only independent research network for the Information Technology (IT) industry. Through a peer network of over 1600 of the world's largest buyers and users of IT, including Citigroup, FedEx, McGraw-Hill, MasterCard, Pfizer, Vodafone, PepsiCo, JPMorgan Chase, and Harvard University, TIP delivers detailed budget, vendor performance and technology roadmap data without spin or bias. Known as the "voice of the customer," TIP helps IT professionals, technology providers, and institutional investors make sound decisions on technologies, vendor relationships and investments. Founded in 2002 by alumni of Gartner, Giga, EMC, and Bell Labs, TIP is headquartered in New York City, with offices in San Francisco, Chicago, and Boston. To learn more, visit www.theinfofro.net or call 1-212-672-0010.

About Gear6

Gear6 delivers the industry's first centralized storage caching solutions that close the widening performance gap between increasingly powerful servers and lagging mechanical storage devices. By transparently delivering scalable, real time data access, Gear6 eliminates productivity-killing I/O bottlenecks and delivers guaranteed transaction response times optimized for time-sensitive Fortune 1000 enterprises. The company's CACHEfx appliances accelerate business critical applications, protect against peak load disruptions and maximize quality of service levels.



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END NOTES

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- 1 TheInfoPro Storage Study Wave 9, What 2-3 key dynamics are causing the growth in Networked Storage?
 - 2 TheInfoPro Storage Study Wave 9, What are your two biggest Storage related pain points?
 - 3 TheInfoPro Server Study Wave 4, What are your two greatest Server-related pain points?
 - 4 TheInfoPro Storage Study Wave 9, What are your top two storage initiatives?
 - 5 TheInfoPro Server Study Wave 4, What are your organizations top two server priorities through 2006?
 - 6 TheInfoPro Server Study Wave 4, Which is the greatest concern regarding Server Virtualization in 2006? In 2009?
 - 7 TheInfoPro Server Study Wave 4, How do you determine which applications to co-locate when consolidating on a single server?
 - 8 TheInfoPro Storage Study Wave 9, What do your business users feel is the most important aspect to improve, regarding Storage services?
 - 9 TheInfoPro Storage Study Wave 9, How often does your company experience application brown-outs?
 - 10 TheInfoPro Storage Study Wave 9, What are your top two storage initiatives? What portion of your storage budget is dedicated to each initiative?
 - 11 TheInfoPro Storage Study Wave 9, How many complete storage frame migrations occurred this year?
 - 12 TheInfoPro Storage Study Wave 9, What is the biggest pain point(s) involving migration?
 - 13 TheInfoPro Storage Study Wave 8, What is the top pain point associated with securing storage?
 - 14 TheInfoPro Storage Study Wave 9, F1000 Predicted NAS Growth
 - 15 TheInfoPro Storage Study Wave 9, For NAS, What is the percentage growth rate (projected) for this year?
 - 16 TheInfoPro Storage Study Wave 9, Clustered File Systems Implementation
 - 17 TheInfoPro Storage Study Wave 9, Rate the importance of the following future array / filer functionalities: NAS
 - 18 TheInfoPro Server Study Wave 4, Which of these benefits is most important in determining whether server virtualization will be used for a particular application in 2007? In 2010?