



# WHITE PAPER

## **Hitachi Data Systems' Silver Lining:** How HDS Enables Cloud Storage

**By Terri McClure**

**April, 2009**

# Table of Contents

<b>Table of Contents</b> .....	<b>i</b>
<b>Cloud Storage 101</b> .....	<b>1</b>
Cloud Storage: Why it Matters .....	2
<b>HDS: The Silver Lining</b> .....	<b>4</b>
HDS' Cloud Vision: What's Next .....	5
<b>Summary</b> .....	<b>6</b>

All trademark names are property of their respective companies. Information contained in this publication has been obtained by sources The Enterprise Strategy Group (ESG) considers to be reliable but is not warranted by ESG. This publication may contain opinions of ESG, which are subject to change from time to time. This publication is copyrighted by The Enterprise Strategy Group, Inc. Any reproduction or redistribution of this publication, in whole or in part, whether in hard-copy format, electronically, or otherwise to persons not authorized to receive it, without the express consent of the Enterprise Strategy Group, Inc., is in violation of U.S. copyright law and will be subject to an action for civil damages and, if applicable, criminal prosecution. Should you have any questions, please contact ESG Client Relations at (508) 482-0188. This ESG White Paper was developed with the assistance and funding of Hitachi Data Systems.

# Cloud Storage 101

Data growth is one of the few sure things in life and a major IT cost, even in a down economy. In fact, for some businesses, data growth is accelerating at this time as more and more organizations use analytics to find new revenue opportunities or ways to tweak the business model and drive top and bottom line growth. So it is no surprise that ESG's research finds that keeping pace with overall data growth is the number one storage challenge faced by IT managers today (see Figure 1).

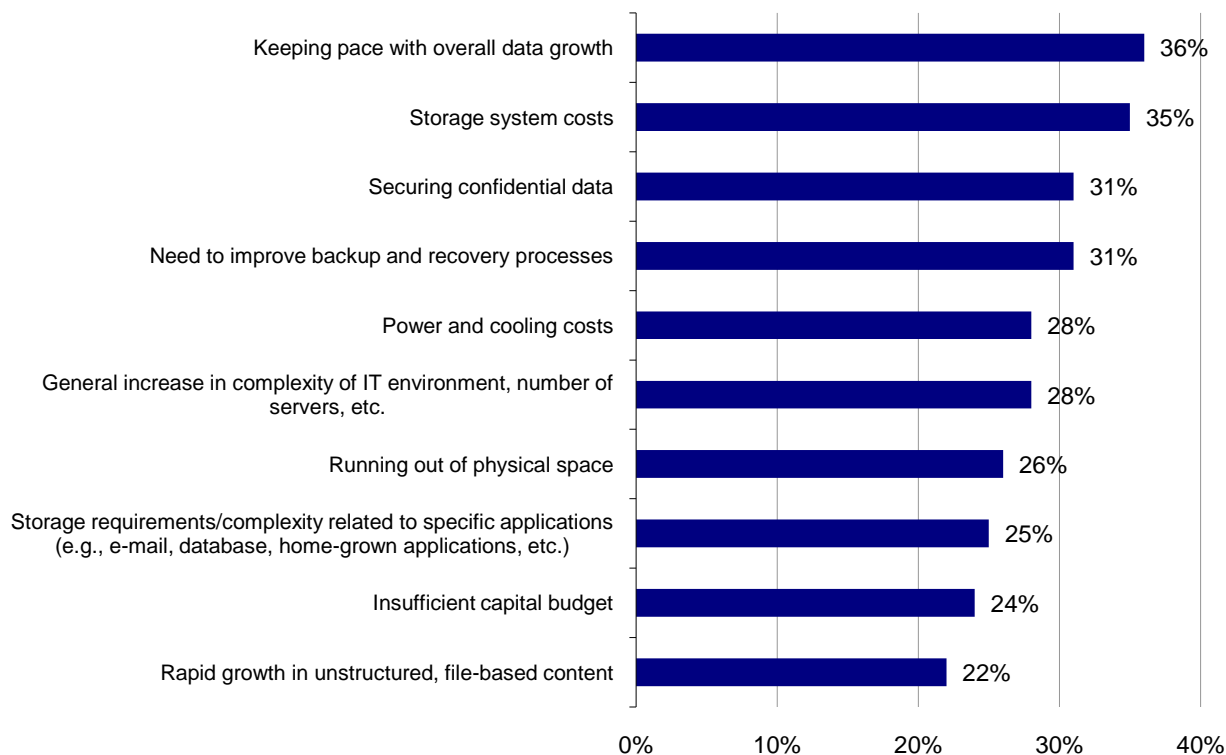
To intensify the issue, the IT market is evolving. The Internet Era of computing is here and commercial enterprises are going to get dragged in—whether they like it or not. Web 2.0, cloud computing, and SOA content/data will coexist with transactional and distributed content in commercial enterprises—requiring a mix of price, performance, and functionality that differs from both.

Traditional storage technologies were not designed for use in the multi-petabyte scale Internet Era. With traditional storage architectures, new arrays need to be added as capacity requirements increase. As the number of arrays under management grows, the storage environment becomes increasingly complex, harder to manage, and more costly to operate. This brings negative consequences to the business—increased time to market, loss of productivity, and decreased flexibility. Traditional storage technologies continue to excel in the areas they were designed to address—namely, transactional and distributed computing—but these solutions fall short at Internet scale.

The pressure to reduce operating costs and do more with less has never been higher, especially in the face of accelerated data growth. IT is facing limited capital budgets and running out of floor space, power, and cooling capacity. These factors are driving users to consider new storage deployment models, like cloud storage.

**FIGURE 1. TOP 10 STORAGE CHALLENGES FACING IT MANAGERS TODAY**

**In general, what are your organization's greatest challenges with respect to its storage environment? (Percent of respondents, N=504, multiple responses accepted)**



Source: ESG Enterprise Storage Survey, 2008

## Cloud Storage: Why it Matters

There are really two components to the cloud that need to be considered, but they are often mixed up in all the hoopla surrounding cloud discussions. There is the cloud service provider and the cloud enabler. Cloud service providers deliver application, platform, and/or infrastructure services via the Internet. Cloud enablers sell products and technologies which allow clouds to be built and cloud services to be delivered efficiently. Hitachi Data Systems (HDS) is a cloud enabler, providing the underlying infrastructure components required to make cloud storage a reality. But before going into the details of how HDS provides storage cloud enablement, it is important to set a common understanding for what the storage cloud is, including its characteristics and deployment models.

ESG defines cloud storage as a combination of hardware, software, and processes designed to efficiently deliver storage services to the business. Cloud storage is delivered as a service via a subscriber model. The service provider can be a company's internal IT group, a third party company that delivers storage services, or a combination of both. Cloud storage economics enable both the service provider and the subscriber to benefit. Service providers gain economies of scale via multi-tenant infrastructure and a predictable, recurring revenue stream. The list of subscriber benefits is much longer, but, in short, cloud storage:

- Shifts storage costs to an operating expense: the subscriber pays only for what it uses.
- Reduces operating expenses: cloud is covered by the service agreement and SLA.
- Moves power, cooling, and the carbon footprint to the cloud service provider.
- Allows the subscriber to balance the value of data with SLAs and costs to determine storage tier, security, and protection requirements.
- Provides business flexibility with subscriber-controlled on-demand capacity and performance.
- Is future-proof: storage media can change behind the cloud curtain without disrupting the business.

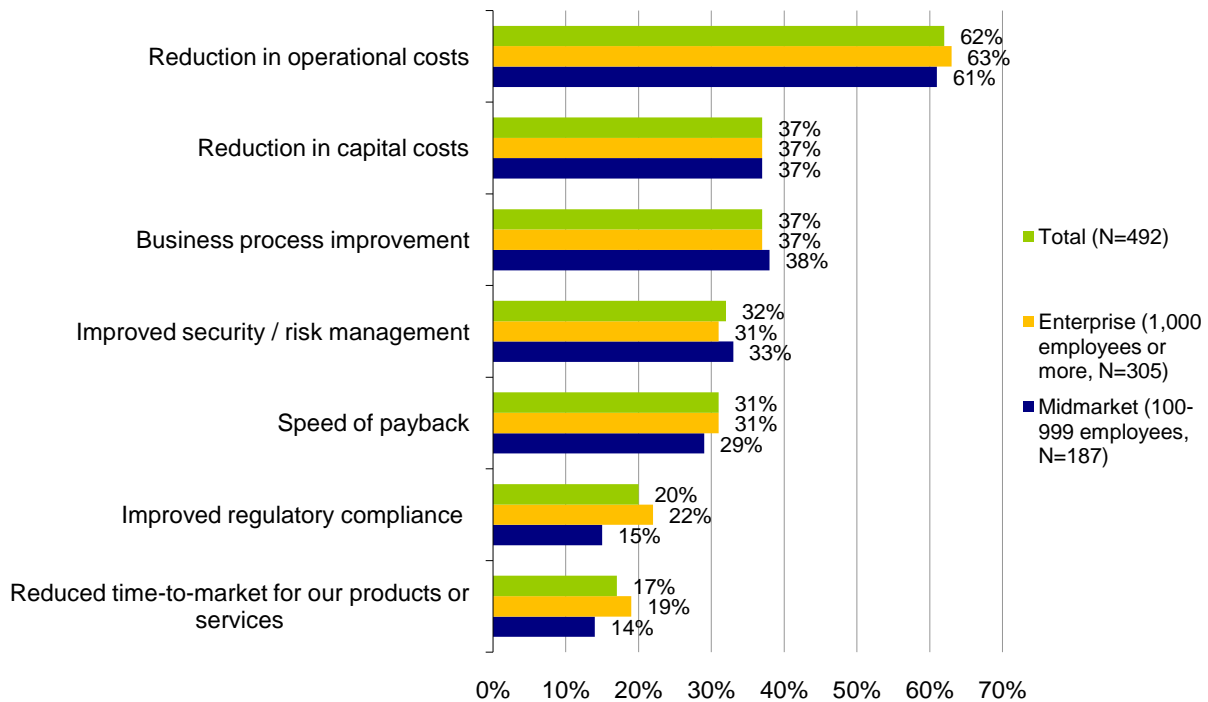
In the current economic climate, cost reduction is king. ESG recently conducted an in-depth survey of 492 senior IT professionals concerning their organizations' IT spending plans and priorities over the next 12-24 months. For both midmarket and enterprise IT professionals, reducing operation costs far outweighed any other criteria for justifying IT purchases over the next twelve to twenty four months (see Figure 2).<sup>1</sup> The ability to reduce operating costs by shifting to a cloud model is one of the key drivers behind the current buzz around cloud storage.

---

<sup>1</sup> Source: ESG Research Report, *2009 Data Center Spending Intentions Survey*, March 2009.

**FIGURE 2. REDUCTION IN OPERATIONAL COSTS IS KEY TO JUSTIFYING IT SPENDING**

Which of the following considerations do you believe will be most important in justifying IT investments to your organization's business management team over the next 12-24 months? (Percent of respondents, multiple responses accepted)



Source: ESG Research Report: 2009 Data Center Spending Intentions Survey, March 2009

A number of characteristics must be a part of the cloud storage offering if both the service provider and subscriber benefits are to be fully realized: cloud storage needs to scale quickly and to tremendous capacities. At a high-level, cloud storage must be elastic, to quickly adapt the underlying infrastructure to changing subscriber demands, and automated, so that policies can be leveraged to make underlying infrastructure changes quickly and without human intervention. Of course, the devil is in the details. The storage cloud must be:

- SLA-driven, automated, and integrated to provide quick response times to user demands.
- Policy-based, with deep levels of automation to move data to the appropriate tier based on content and SLAs.
- Secure, reliable, and scalable to multi-PB capacity with a unified management view for both block and file storage.

The last piece in the cloud storage puzzle is that the storage cloud needs to be federated and flexible. Enterprise users have varying degrees of comfort when it comes to storing corporate data offsite, no matter how secure the storage service provider is or claims to be. The need to meet data security concerns and gain a level of comfort with the cloud storage model is driving three deployment models: public, private, and hybrid. In a private cloud, all components live within the firewall or in a physically isolated offsite storage infrastructure accessed via VPN. In a public cloud, all components sit outside the firewall in a shared infrastructure that is logically partitioned (multi-tenant) for security and accessed over secured IP. And, in a hybrid cloud, some components sit within the firewall—such as a local gateway, storage cache, or bulk storage capacity—while some components are outside the firewall on multi-tenant infrastructure (storage capacity).

Not all applications are suited for cloud storage. Just as data in the data center needs to have performance, protection, and availability requirements defined to map data to the right storage tier, these considerations are doubly important when shifting storage to the cloud. Latency is a key consideration—no matter how good the infrastructure provider is, no one has yet figured out how to beat the speed of light. Latency is not a big issue in private clouds (unless the internal service provider has geographically dispersed subscribers), but it becomes a

key issue for consideration in hybrid and public clouds. Because of the latency issue, the cloud is most suited as a storage infrastructure for latency-tolerant applications such as backup, archive, and disaster recovery. It is also suited for meeting cyclical storage demands (peak workloads) for enterprise applications, provided the applications can tolerate some level of additional latency.

For global enterprises and service providers, cloud storage can be leveraged for applications requiring collaboration over geographic distances since policies can be set to place data in the geographic region from which it will be accessed most, significantly reducing latency. And last, but one of the greatest opportunities for service providers: cloud storage is an ideal solution for consumers to extend primary storage and backup capacity. Consumers are accustomed to using the Internet to access data, music, and video—latency is not as much of an issue for consumers as it is for commercial users. But commercial buyers beware—one of the challenges in moving to the storage cloud is the ability for the application to write outside its traditional implementation environment, especially in a hybrid cloud. That is one of the reasons NAS-based applications have seen early adoption—NAS is easily ported to a cloud model.

The challenges outlined in this paper are strikingly similar to those found in the traditional data center, only magnified. The bottom line is that the storage cloud is yet another deployment model for tiered storage that needs to offer a variety of service levels to meet user needs. In today's commercial data center, there is no one-size-fits-all answer to storage. The same is true for both cloud storage providers and IT shops offering storage services (private cloud storage). That is why the foundational technology on which a private cloud or the service provider cloud is based is so important! Evaluating service providers for private, public or hybrid cloud services means evaluating the underlying infrastructure on which the cloud storage offering is built to ensure it is secure (encrypted, immutable, access controlled), elastic, automated, and based on mature market-proven technology. HDS' data center experience and reputation for providing rock-solid solutions are core strengths and will serve it well in the service provider space.

## HDS: The Silver Lining

HDS has a number of cloud enabling technologies in its portfolio—the company recognizes that there is no cookie-cutter approach to building a cloud infrastructure. Rather, it will require an integrated portfolio approach that empowers data center customers who are building private clouds and cloud service providers for public clouds, to build a robust set of storage services that meet customer needs. HDS already has the integrated portfolio and is a trusted infrastructure vendor. Its experience in the data center provides deep roots and a proven architecture. It has been building a broad ranging portfolio of products to meet business challenges for years—and is now applying that portfolio to the emerging cloud storage market.

This portfolio is not comprised of 'point-products' (although they can be employed as such). Instead, each offering is designed to be a part of a broader whole. These offerings include multiple storage tiers to balance resource utilization and satisfy defined service-levels, and to migrate data dynamically and automatically across storage tiers. This ease of migration is important: ESG research has found that the number one challenge for users to address when implementing energy-efficient IT products and architectures in data centers is centered on mitigating the cost, disruption, and complexity of migrating data to more efficient systems.<sup>2</sup>

Building and maintaining an efficient infrastructure and seamlessly migrating to new tiers of storage according to SLAs will be critical to the success of cloud storage service providers. The HDS portfolio includes integrated solutions that allow cloud storage service providers to match subscriber SLAs with cost-appropriate solutions and storage tiers, migrate data between tiers non-disruptively, manage the environment efficiently through a common management interface, and secure data at multiple levels.

- Hitachi provides best-in-class intelligent tiered storage through its storage management software, storage virtualization solutions, digital archiving, NAS (both its own and from other vendors) and data

---

<sup>2</sup> Source: ESG Report, *Global Green IT Priorities: Beyond Data Center Power and Cooling*, November, 2008

discovery software. Although best known for its high-end SAN systems, Hitachi provides one of the industry's most integrated storage portfolios, rather than silo-ed storage islands. Customers can search across the boundaries of NAS and archive tiers; perform content-aware, policy-based data migration across systems; and utilize the same management interface for block, file and content.

- The Hitachi Data Systems virtualization platform is what allows cloud storage providers and IT shops offering storage services (private cloud storage) to easily redeploy resources to support new business requirements—a truly liquid environment that supports both heterogeneous O/S platforms (such as Windows, Linux, Unix variants, and z/OS) on the front end and heterogeneous storage systems of varying classes on the back-end. User applications see all storage systems as a single entity. The HDS virtualization solution provides dynamically provisioned volume management (thin provisioning), data migrations, snapshot copies, and remote replication functionality for all of these storage systems. They are built as virtualization 'hubs' at the center of users' processors and storage systems.
- Effective tiering aligns the business value of data with the cost of storing that data; in practical terms, it is less a matter of supporting multiple types of storage and more a matter of automating the movement of data between them so that the whole environment can be managed based on policies to permit more granular (and if needed, more frequent) data movement. And, since Hitachi can use virtualization to manage across not only its own products, but many others, too, it also happens to ensure that multiple types of storage can indeed be managed.
- Virtualized block and file storage insulates users from underlying infrastructure changes, scales to massive capacity, and is managed from a single console that provides a multi-PB span of management per administrator for exceptional efficiency.
- Multi-tenancy allows subscribers to run secure virtual private machines and thus drive utilization rates higher. With access rights and security layers to prevent unauthorized access to the systems, encryption to prevent unauthorized access to the data, and immutable media to prevent alteration of fixed content and meet regulatory requirements, subscribers can rest assured their data is safe.

HDS technology is well suited to be the cloud infrastructure provider for private cloud and remote storage services. HDS provides a secure infrastructure that is policy-driven to meet business rules—elastic and automated. It is trusted and secure. Users can't afford downtime—no more than you could afford downtime in your own data center

### **HDS' Cloud Vision: What's Next**

HDS has a well rounded vision for the future of cloud storage. Its vision is to build on its foundation of providing the industry's most integrated storage capabilities at the infrastructure layer, which provides the backbone to create cloud infrastructures for its customers' unique requirements. Leveraging its expertise in block, file, and content storage, HDS is bringing the same type of data center integration, reliability, automation, security, storage efficiency, and performance to cost effectively scale cloud storage environments from terabytes to exabytes.

Over time, expect HDS to continue working to ensure cost-correct storage tiers with support for new and alternative media types, enhanced tiered storage management, and broad support of third party offerings; to continue to simplify geographic dispersion of content and content management with multiple replication schemes and wide area search; and to further enhance content management with versioning support, a virtual search space, and end-user interface into the cloud storage infrastructure. Cloud storage is still very early in its development, and while some enablement technology is mature, much of the technology to transition to a subscriber model, put full SLA-based control into the hands of users, and fully automate the back-end to ensure SLAs are met, is still evolving. HDS' recognition that one-size-fits-all is not an answer is reflected in its vision of offering a robust set of tiered storage services that can be mixed and matched to meet user requirements.

## Summary

Cloud storage is a reality, but nobody has all the pieces in place to accomplish everything covered in this paper—yet. That makes it all the more important for enterprises considering a move to the cloud, and cloud storage service providers themselves, to ensure they go with an underlying technology vendor that has a complete cloud enablement vision.

The potential for cloud storage to ease IT operation burdens is huge: no more long planning cycles and having to buy (install, power, and cool) capacity well ahead of demand; a flexible, liquid infrastructure that allows IT to redeploy resources almost instantly in support of the business; greater insight into the utilization and audit trail of the infrastructure; and control of storage SLAs into the hands of the application owner/administrator, closer to the business. And don't forget the "greenness" cloud storage brings to IT—service providers can build more environmentally friendly data centers thanks to efficient, shared, multi-tenant infrastructures while subscribers can significantly reduce power, cooling, and facility costs not just from moving capacity offsite, but also for only paying for what is actually used.

For storage service providers, public and private, HDS' current integrated tool set provides a broad portfolio of services that enable cloud storage service providers today. The cloud storage provider gains economies of scale and management efficiencies, and the security of deploying mature, trusted platforms. HDS has a complete vision for tomorrow to develop the tools that will enable cloud storage to realize its full potential as a truly viable way to economically meet storage demands—from the consumer to the enterprise.



20 Asylum Street  
Milford, MA 01757  
Tel: 508-482-0188  
Fax: 508-482-0218

[www.enterprisestrategygroup.com](http://www.enterprisestrategygroup.com)