For Clouds That Are Flexible, Efficient and Trusted

Hitachi Data Systems delivers secure, flexible, scalable and easy-to-manage cloud storage infrastructures that enable you to lower total cost of ownership, meet service level agreements, and improve operational efficiency. Our data and content mobility solutions support workers who are “on the go,” in remote offices, and using devices they prefer. The solutions enable you to intelligently extend to public clouds where it makes sense. With Hitachi cloud solutions, you can leverage a choice of cloud delivery models, including private, public and hybrid. This selection allows you to achieve cost and resource benefits of the cloud in a way that makes sense for your business. As your content, data and analytics needs grow, our cloud solutions will be there to grow with them.

Overview

Ever-increasing complexity and the massive growth of data are taxing today’s data centers, multiplying the compute resources required to store, process, optimize and serve information back to end users. As they have attempted to address these issues, organizations are increasingly looking to cloud delivery service models to reduce costs, increase flexibility, and improve their time to market. Cloud’s ability to grow and contract storage resources, in concert with business needs, can reduce or eliminate upfront capital expenditure (capex) for underutilized assets. It also minimizes operational expenses (opex) due to continual data growth and management complexity.

Much of the aforementioned data growth is unstructured and reflects new use cases (for example, media and entertainment, as well as healthcare applications). To address the growth, many organizations have built large network attached storage (NAS), Microsoft® SharePoint® and other application environments that have become increasingly complex to manage and costly to operate. Such environments also take precious resources away from the most active and frequently accessed data. For some organizations, a majority of the data residing in primary storage is either stale or not often needed to support business operations or decision-making. This data requires constant backup and management, which,
in turn, consumes more capacity and IT resources. In addition, in many cases it resides on Tier 1 storage, causing the overall total cost of ownership (TCO) for this environment to be very high.

Storing these growing volumes of unstructured data is one issue confronting organizations today. Making it reliably available for use to those who need it to get their jobs done creates another set of challenges. Today’s workers are more mobile, working with devices that they prefer to use. Many often reside in remote or branch offices (ROBOs) where they require timely data access. Replicating all data at all ROBOs is capital intensive and expensive, while not doing so can negatively impact performance. Whether the use case is a group of geographically separated, mobile workers collaborating on a project, or a media company serving content to customers, delivering data and content in a cost-efficient, timely and secure manner is the challenge.

What is needed is a “mobilization” of data and content so they can be securely delivered when and where they are needed. The cloud is an effective way of making this happen. However, doing the job right will likely mean cloud implementations that are agile enough to help the organization optimize the solution for their specific needs. This approach may mean a combination of cloud delivery models (private, public, hybrid) that would enable data to be cost-effectively stored where it makes sense. It also requires a mechanism by which data can be moved across clouds based on cost, performance and other policy-based criteria.

The Hitachi Cloud Vision and Strategy

Cloud is not a single product, but rather a way to provide IT services. The Hitachi Data Systems approach offers a comprehensive set of solutions and service offerings, allowing you to choose the best possible solutions to address your cloud needs, while protecting your existing investments.

The Hitachi approach to the cloud (see Figure 1) recognizes the fact that organizations have made significant investments in their existing data center assets. Embracing the cloud means transforming their data centers to enable cloud solutions, and then extending the IT attributes beyond the data center into the cloud. With Hitachi, you are no longer limited to the technology, platform or cost options tied to either your traditional data center, or a private cloud. With our “extend beyond” approach, you can take advantage of a variety of cloud options and providers, and gain the agility needed to optimize your cloud solutions.

Hitachi is part of an extensive ecosystem of partners and vendors that enable the creation of compelling, unique cloud solutions. This approach not only allows us to extend the capabilities we can deliver to your cloud solutions, but also to do so in a way that is consistent with your existing investments. Extensive, proven Hitachi technologies, solutions and services make it possible for us to deliver cloud solutions that are highly flexible (embracing a variety of cloud delivery and consumption models), efficient (enabling solutions that are the most cost-effective possible), and trusted (built on a foundation of quality, security and performance).

Move to the Cloud With Hitachi Data Systems

Private Cloud and Beyond

For many organizations, the 1st step is to embark on a series of steps to transform and modernize their data centers to create a private cloud. Whether a full private cloud implementation is your goal, or you want to transform and modernize all or parts of your data center infrastructure, your success depends on the approach you take. Using an organized, multistep process that starts with building a cost-effective, efficient foundation can help you fully leverage the benefits of modernization and a services-driven environment.

Our methodology to transform traditional IT to a private cloud involves 4 major steps that build on each other (see Figure 2). The ultimate goal is to create a fully integrated and efficiently managed pool of IT services capable of providing stakeholders with the resources they need at the service levels they require:

- **Consolidate.** This 1st step involves reducing your IT footprint. Lower overall costs by decreasing capex, bringing space and utility costs down, and lessening the administrative resources required.
- **Virtualize.** This 2nd step allows you to extract greater value and to become more efficient. You can create a single virtual pool of all resources, including file, block and object storage, servers and applications, with the ability to manage across all of these resources. Resources in this pool can then be dynamically provisioned on demand.
- **Automate.** The 3rd step is to automate your IT management and administrative processes to enhance your ability to meet committed service levels while making IT and stakeholders more productive. When applied to an infrastructure composed of integrated pools of compute and storage resources, and a complex mix of applications, automation can ease managing and provisioning tasks. Automation can deliver services with greater speed and reliability.
Innovation is the engine of change, and information is its fuel. Innovate intelligently to lead your market, grow your company, and change the world. Manage your information with Hitachi Data Systems.

www.HDS.com/innovate

At the heart of our cloud solutions are a set of proven, cloud-enabled platforms that support the unified, virtualized and distributed environments common in organizations today (see Table 1). These environments form the foundation for private, public and hybrid cloud implementations.

HDS offers organizations several delivery and consumption models for their private clouds. They can choose to own or lease their private cloud infrastructure from HDS, and choose among a variety of financial options that mix capex and opex investments. Organizations can also choose whether to manage their private cloud themselves or have HDS do it for them. They can choose for HDS to own and manage the private cloud infrastructure assets, providing an immediate return on investment (ROI) via a pure opex model.

It is instructive to examine some of our products that support the private cloud in the context of their use in specific cloud-based implementations.

Content Mobility: A Portfolio Approach

Many cloud applications today are being implemented to support workers who are highly mobile and/or are geographically dispersed. Not only does this mean that workers are no longer tied to specific offices, but this trend toward “mobility” is also resulting in a rise of different types, styles and brands of end-point devices. These are devices that workers prefer and not necessarily the ones that IT would want them to use.

While many organizations are building private clouds within their transformed data centers, they are wisely focused on architecting their data centers to embrace hybrid clouds. As noted earlier, making the best use of the cloud can sometimes mean taking advantage of cloud options that have different cost and delivery model characteristics; this can mean using a private cloud for some data and content and a public cloud for the rest. For instance, for data that is not accessed often, or is old but must be retained for regulatory purposes, inexpensive public cloud storage might make sense. For mission-critical and more frequently accessed data, private cloud may be the way to go.

### TABLE 1. HDS PRODUCTS FOR THE PRIVATE CLOUD

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<th>Process Step</th>
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Self-Service. In the 4th step, adding self-service capabilities completes your path to the private cloud. These capabilities, which should include chargeback and/or showback functions, are provided via a portal or other user access framework that enables end users to select the services they need and choose the service level required based on their roles.
These changes are giving rise to the need for real-time, remote access to content and information that workers need to collaborate and get their jobs done. Whether they are on the road, in a different office or traveling between work sites or meetings, they cannot afford to be “offline.”

Of course, mobility means more than just using a portable device. Effective accessibility in a world of mobile and remote workers requires a mobility strategy that enables the flexible movement of data and content without compromising the visibility or control IT is accustomed to having. The cloud is an important element in making this happen. It is an approach that leverages both on-site and off-site clouds (that is, a hybrid cloud approach). It not only helps organizations meet their access and performance requirements more effectively, but also helps them balance their opex and capex cost profiles.

As shown in Figure 3, this strategy provides:

- **Agility** that enables the growth and sustainability of employee productivity through the mobilization of content across any and all IP enabled devices. It automatically handles the storage and management of growing data and content stores across private and public cloud.
- **Secure access** to information without the need to compromise the control, visibility and comprehensive security policies employed by IT.
- **Cost optimization** based on leveraging cloud topologies, virtual solutions, enhanced content distribution, remote system configuration and attractively priced public cloud services to lower costs and increase profitability.

Object storage is growing in popularity as a technology to support cloud services and as a platform for data mobility solutions, and metadata is one reason. With metadata, object storage software can bring structure to unstructured data, making it possible to search and extract value as well as to drive the policies that make data dynamically mobile across devices, sites and services.

Hitachi Content Platform (HCP) is Hitachi Data Systems object storage software, providing the highly scalable and reliable enterprise-class storage infrastructure that serves as the core of many of our cloud solutions. HCP enables creation of an agile and efficient content environment with broad protocol support that allows a variety of workloads. With its multitenant object storage environment, HCP securely segregates data within different namespaces to prevent unauthorized access.

Key cloud-enabled HCP features include:

- **Large-scale multitenancy.** Thousands of separate tenants and tens of thousands of namespaces are supported, each of which can be uniquely configured for a subscriber.
- **Massive scale.** HCP offers up to 80PB of storage, 80 nodes and 64 billion user objects in a single system, with the ability to add nodes or storage independently and without disruption.
- **Representative state transfer (REST) and Amazon S3 API support.** This feature enables HCP to take in data from cloud applications as well as send data out and move data among cloud services.
- **Custom metadata.** HCP enables more accurate content access. It provides the meaningful information needed to efficiently and intelligently process data and apply the right object policies to meet business, compliance and protection requirements.
- **Fixed content archiving.** Using “write once, read many” (WORM) storage and file versioning technology, HCP ensures that data in its repository cannot be updated or modified while previous versions are retained for self-service recovery, compliance and auditability.
- **Backup-free data protection and content preservation.** HCP is a true backup-free platform. It protects content using a set of sophisticated data preservation technologies (including RAID, replication, integrity checking, metadata redundancy and more).

In addition, a number of unique capabilities have been added to HCP in its latest release. They more effectively support the use of both public and private clouds to store and manage data and to access it faster and more reliably:

- **OpenStack Swift API Support.** This feature allows HCP to function as a Swift object repository and interoperate with existing OpenStack components by implementing Swift API calls documented by openstack.org. Supported capabilities include integration with the OpenStack Keystone identity and token service, Glance VM image management service, and Horizon Web-based user interface service. HCP offers OpenStack applications numerous new capabilities, such as deduplication, compression, WORM compliance features, information lifecycle management (DAS, SAN, cloud), RAID and erasure coding, chargeback information and search. No more waiting for basic functionality to catch up with your enterprise data-center needs; leverage your object storage investment to tackle not only OpenStack, but also literally hundreds of other archive, mobility and IT-enablement service requirements today.
- **Adaptive cloud tiering.** This feature (see Figure 4) enables HCP to automatically tier data to public cloud services, including Microsoft Windows Azure®, Amazon S3, the Google Cloud Platform, and Hitachi’s own cloud-based archiving service (Hitachi Cloud Services, discussed later in this
document). In fact, using this feature, organizations can tier to any S3-enabled cloud. Tiering criteria can be based on a variety of metadata-based information, such as when data was last accessed based on a variety of metadata-based information, such as when data was last accessed or time since object creation.

The adaptive cloud-tiering feature can also leverage another capability of HCP to achieve optimal use of cloud options. The HCP service panel allows organizations to define policies for tiering of data: They can put data where it needs to be while maintaining the control and visibility they require and expect. “Trust zones,” consisting of groups of people, information resources, data systems, and/or networks, can be configured via the service panel to share a security policy. For instance, a “bronze” level trust zone can be created where an organization’s data is securely ingested by HCP and then moved to an S3 cloud.

- **Global access topology.** This feature enables a topology in which globally distributed HCPs are synchronized. It allows users and applications to access data from the closest HCP site for improved performance, collaboration and availability. This feature allows replication links to be configured among 5 HCP instances. When content is written at one site, it will be replicated to the other sites. Data written at other sites will also be synchronized in the same fashion with the other HCPs. In addition to the layout shown on the left side of Figure 5, organizations can configure a “ring” topology containing up to 5 HCP instances, where data and content “follow the sun” from one HCP instance to another.

However, the features and benefits of our global access topology feature are not just limited to 5 HCP platforms. In fact, groups of up to 5 HCP instances can be configured to increase the performance and availability of content across a wider range of geographies (see Figure 5, right side). In this way, it can more effectively support collaboration and the work of mobile, remote and geographically dispersed workers.

To augment the capabilities of HCP to support extending the enterprise into the cloud and data mobility, HDS offers organizations 2 other important products. The 1st product, Hitachi Content Platform Anywhere, is a fully integrated, on-premises solution for safe, secure file sharing and synchronization. HCP Anywhere is enterprise and Internet ready, and uses Hitachi Content Platform to store, protect, share, sync, secure and manage data.

End users simply save a file to their HCP Anywhere folder and it automatically synchronizes to all of their registered devices and is available via popular Web browsers. Once saved to the HCP Anywhere folder, the file is protected, compressed, single instanced, encrypted, replicated and access controlled by the well-proven HCP.

Deployment and setup is easy. Administrators can install HCP Anywhere onto HCP and import user permissions via Microsoft Active Directory®. End users then can self-register using their Active Directory credentials and download the software for their particular devices either from the user portal or from the Apple iTunes store for iOS devices and Google Play for Android devices. HCP Anywhere also supports VMware, making it possible to use it within that environment.

The 2nd product, Hitachi Data Ingestor (HDI), is a low-cost, low-touch cloud file server that greatly reduces the need for IT resources beyond the data center. This cloud “on ramp” automatically copies all data to a central HCP, keeping certain files in the local cache for easy access and...
making all other files accessible via links to that HCP. HDI enables configuration, provisioning, management and monitoring of elastic, backup-free file services outside the data center. HDI also provides roaming home directories, a feature that allows application users’ permissions to follow them from office to office, enabling content mobility across remote or branch office locations.

HCP, HCP Anywhere and HDI form a portfolio of products that represent a true end-to-end, integrated, on-premises solution. The portfolio supports safe, secure file sharing, file synchronization and file services to meet the IT needs of enterprises as they continue to take advantage of the benefits of private, public, and hybrid clouds (see Figure 6). IT can now mobilize content among devices, locations, applications and storage resources efficiently, securely and with the performance its users expect.

Continuous Cloud Infrastructure: Superior Availability for the Private Cloud

Today, enterprises are being challenged in various ways. Achieving higher levels of service within the data center is also a major focus of IT today, driving it to seek out solutions that provide higher performance and greater availability. The push to reduce operational costs has not abated, making more effective automation and greater agility important priorities as well.

With Continuous Cloud Infrastructure, Hitachi Data Systems delivers products and solutions that meet the availability, automation and agility needs of organizations building private clouds today. At the heart of Continuous Cloud Infrastructure is Hitachi Virtual Storage Platform (VSP) G1000. This next-generation, highly scalable version of the proven Hitachi VSP storage management platform delivers up to 3 times the performance of its predecessor. The software foundation for VSP G1000 is Hitachi Storage Virtualization Operating System (SVOS). SVOS provides software-defined storage management and global storage virtualization across what are in essence “virtual storage machines.” These provide a virtual abstraction of physical storage resources either within a single system, or multiple, geographically dispersed systems. The fully redundant architecture of VSP G1000 ensures that there is no single point of failure for environments that demand 100% uptime.

Hitachi Command Suite v8, the newest version of this unified management product that supports Continuous Cloud Infrastructure, extends this product’s capabilities to support centralized, integrated management of all storage and server resources. Configuration, performance, replication and other key functions can be managed more efficiently under a common management framework.

Hitachi Cloud Services for Hybrid Cloud Storage

As noted earlier, many organizations looking to move their data to the cloud often begin with a private cloud. This choice may be driven by a variety of factors, involving control, regulatory issues or the desire to leverage existing resources. For others, the public cloud may be a better option. IT resources may be more scarce or less skilled in areas needed to support a private cloud. However, a public cloud can help free up these resources to focus more on business-critical needs and innovation.

Hitachi Cloud Services is an HDS owned and managed, enterprise-level, public, enterprise-to-cloud offering. It provides a set of sophisticated cloud storage services as well as REST API support to enable interoperability with enterprise applications. As with other Hitachi cloud solutions options, HDS provides off-site, public storage for the data you send to the cloud using our proven platforms. At the same time, we support easy, reliable access to the data, regardless of your location.

To support an organization’s hybrid cloud data storage needs, Hitachi Cloud Services delivers 3 services (File Tiering, File Serving, Microsoft SharePoint Archiving). They are delivered in the form of a fully managed service called Hitachi Cloud Service for Content Archiving. This service can:

- Move content from primary storage into cloud storage.
- Back up files stored remotely.
- Monitor performance, and address any performance-related issues before they impact your service level agreements (SLAs).

HDS provides private cloud solutions that directly address today’s storage challenges in a scalable, easily provisioned, pay-per-use approach. By leveraging a private, public and hybrid cloud delivery model, organizations can reduce costs, allow seamless access to tiered data, simplify management, improve efficiency and lower costs.
- Return version files to the cloud once they are changed.
- Handle on-demand capacity requests.
- Pay for service based on a fixed rate per storage unit per month.

Hitachi Cloud Service for Content Archiving lets you get maximum value from your data while passing data management responsibilities and infrastructure upgrades to Hitachi Data Systems. It can be customized based on your application archiving and content requirements, and includes such value-added content services as index and search across multiple data types. Customization options will expand in the future to include compute and analytics capabilities.

One of the most important features of Hitachi Cloud Services is its support of the REST API. This API is part of a Web-based architectural definition for the interaction among, and behavior of, clients and servers on the Web. For the cloud, this means that applications and other resources can interoperate based on a well-defined API standard.

Hitachi Cloud Services leverages the REST API to provide a variety of on-ramps to the cloud, enabling its seamless integration with popular enterprise applications. Cloud on-ramps are a critical component of an overall cloud architecture, enabling organizations to connect their private enterprise IT to external public cloud services. They also make it easy to leverage the cloud for your data by creating an efficient mechanism for data movement and access.

In addition to our HDI product discussed earlier, Hitachi NAS Platform is also an on-ramp to our Hitachi Cloud Services public cloud. Further, HDS has implemented a cloud on-ramp testing program through our Technology Alliance Program to make it easy for others to help us broaden your choice of options. Today, both Rocket Software and CommVault are part of that program, and offer additional options for archiving and tiering data to and from our Hitachi Cloud Services public cloud (see Figure 7).

Hitachi Cloud Services can play an important role in relieving the problem of storing, managing and protecting increasing data volumes. We target your most challenging storage problems with integrated solutions that eliminate upfront capex for underutilized assets.

### Summary

Hitachi cloud solutions help organizations leverage the cloud to meet their data storage and management, compute and economic needs. Our data and content mobility solutions make it possible to intelligently tier data where it makes sense given usage, sensitivity and cost. Our Continuous Cloud Infrastructure brings unprecedented levels of automation and availability to cloud implementations.

Depending on their specific needs, organizations will want to choose among various cloud delivery models and cloud services. HDS provides that choice by delivering, either directly or through partners, a comprehensive set of cloud solutions that bring the benefits of the cloud to you, in a way that makes sense for you.

### For More Information

For more information regarding the capabilities of Hitachi cloud solutions and how they can support your data center, please contact your Hitachi Data Systems representative or visit www.HDS.com.