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Continuous Cloud Infrastructure: The First Business-Defined IT Architecture

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Executive Summary

Technology has changed nearly everything about how business is conducted. As the world rapidly morphs into a mobile-driven society, the workplace is subject to an onslaught of trends, including the consumerism of IT and bring your own device (BYOD) to work. Mobile devices, cloud services, big data analytics and social media are promptly crowding the digital universe. And new technologies enter that cosmos every day. They range from fingerprint reading, eyeball movement trackers and location-based services to mobile commerce and the sensors in buildings, cars, planes and even vending machines. Even customer relationship management (CRM) and enterprise resource planning (ERP) apps have joined email, calendaring and instant messages in the mobile work environment. End users seek to access this information wherever and whenever.

As enterprises look to embrace new technologies and mobility, IT must be prepared for the growing number of devices it may or may not control but will support. IT must be at the ready for ever-increasing changes in business direction, scope and demands. The new benchmark for commerce seems to be 24/7 global access, no matter what, and it affects both the lines of business and IT. A new way of looking at change is required.

Yesterday's thinking, on business productivity and IT agility and services, has become today's attention to information agility and next-generation business innovation. Even when organizations change the thinking, persistent IT challenges remain. Resource inefficiencies, rising costs and business disruptions are still the principal problems. At what point does it all become too much for a business to accept or for IT to handle? How can organizations survive the unprecedented levels of growth and change, and still innovate?

The business-defined data center has emerged as a model for helping organizations cope and flourish in the new reality of change. The business-defined data center promotes superior capabilities for delivering services faster and continuously, and proactively welcoming new opportunities to achieve business advantage. With the right technology in place, companies have a better chance of satisfying immediate business needs and future growth.

Because the always-on world is always changing, Hitachi introduces a new kind of infrastructure to support business-driven IT and equip the future-ready enterprise for whatever comes next. This paper defines continuous cloud infrastructure, a cohesive framework of advanced technologies united to orchestrate the overwhelming, all-consuming levels of change arriving in the business world. The document examines the technologies involved, the business benefits, and the IT economic results of Hitachi-powered continuous cloud infrastructure. Real-world uses cases cite the most pressing reasons for using continuous cloud infrastructure to fast-track business innovation and growth.

Hitachi Data Systems IT Economics defines a new basis for measuring what matters to the business-driven data center and to help enterprises derive the greatest business value. IT Economics pinpoints the actual cost reductions associated with continuous cloud infrastructure deployments. It evaluates these results, considering previous storage, key technologies and new business acceleration opportunities. At the conclusion of this paper, Hitachi Data Systems will have demonstrated how continuous cloud infrastructure can help even the most dynamic enterprise overcome the challenges of change.

Introduction

Change is a universal constant. From global life-changing events to how a business meets changing requirements, success can be contributed to how well one adapts, remains flexible and continues moving forward.

When it comes to the technology frontier, welcome to the era of perpetual change in an “always-on” world. Mobile devices and broadband, cloud services, big data analytics and social media are rapidly pushing into an already crowded and unruly digital universe. The number of digital users, apps, services and content in existence is nearing the trillions. Enterprise apps, such as email, calendaring, instant messaging, and office and personal productivity are among the most popular use of mobile apps, according to a recent Gartner survey. CRM and ERP apps are rapidly going mobile as well. And cloud spending is also expected to grow by 25% and reach US$ 100 billion in the upcoming year.

With this evolutionary continuum comes more complexity, cost and risk that also must be addressed. Businesses try to tackle a new round of customer requests, real-time expectations or competitive goals, but acceleration of change can escape the everyday understanding of what to do next. From the rate of adoption of new technologies and subsequent data growth to incessantly changing business requirements and a faster push to market, the challenge to keep up is unprecedented. At what point does it all become too much for a business to accept or for IT to handle? How can organizations survive the unprecedented levels of growth and change, and still innovate?

Change Is The Challenge

Enterprises confronted by continuous change must dispatch a different approach to stay ahead of whatever is coming next. Finding success in this fresh paradigm entails a new partnership between IT and lines of business. While IT and lines of business have habitually collaborated to meet business user and customer demands, there are still gaps in focus.

For instance, when surveyed, over 40% of line-of-business leaders perceived the impact of mobile technologies to significantly transform the organization, while only 20% of IT leaders agreed. Mobility is already an imperative design point, with billions of consumer, communications and energy devices presently in use. Moreover, mobility has become an ever-moving target, as new technologies enter the arena. They range from fingerprint reading, eyeball movement trackers and location-based services to mobile commerce and the sensors in buildings, cars, planes and even vending machines.

As enterprises move closer to exploiting mobility beyond smart phones and tablets, IT must be prepared for the growing number of devices it may or may not control but will support. And mobility represents only a fraction of the magnitude of changes for which enterprise IT organizations must prepare. Business and IT leaders alike are looking for answers to navigate the uncertainties and inevitabilities of change.

Change the Thinking

Albert Einstein is credited with the quote, “We cannot solve our problems with the same thinking we used when we created them.” Yesterday’s thinking, on business productivity and IT agility and services, has become today’s attention to information agility and next-generation business innovation. Businesses want their IT organizations to help increase employee productivity, which usually involves additional applications, data formats and remote access. The consumerism of IT and the bring-your-own-device trends have also raised end user expectations and IT demands. A survey by Dimensional Research revealed that 59% of respondents indicated that their IT department has already taken on support of more operating systems. This effort became essential as employees were bringing their own devices to work.

The new benchmark for commerce seems to be 24/7 global access, no matter what, and it affects both the lines of business and IT. As the business looks to improve overall quality to meet user and customer expectations, IT must up-level the capabilities to meet commitments for quality of service (QoS), availability and guarantees. The enterprise

recognizes that time is money and is pushing for faster delivery of services and products to market. In turn, IT is pressed to deploy applications and services faster, too, and with greater elasticity to respond to competitive requirements.

The new perspective is that IT can meet business needs and stimulate revenue generation. The new thinking is that the business must determine how best to balance its challenges and what the data center of tomorrow will look like.

Change the Doing

Even when organizations change the thinking, persistent IT challenges remain. Resource inefficiencies, rising costs and business disruptions are still the principal problems. In many cases, organizations are dealing with myriad issues. Such challenges can include disparate systems and multiple management points, lack of visibility or automation across the data center, and low levels of shared or unified resources. Data and systems can be available but not necessarily accessible, which drives down flexibility and utilization, then pushes up complexities and costs. Silos impact administrative costs and environmental expenses, including power, cooling and floor space.

Just as technology strives to always improve upon itself, so must the IT organization. Tech refreshes are important to maintain competitive advantage and IT agility, but not at the expense of uptime or business operation. IT is expected to ensure that services remain uninterrupted and data availability and security are not compromised. Integral to every department and most business transactions, technology plays a mission-critical role across the enterprise. And despite the stubborn challenges that permeate the data center, the business value of IT has never been more significant than now.

Business-Defined Data Center

The business-defined data center is an emerging model for enabling organizations to cope and indeed flourish in the new reality of change. A business-defined data center promotes superior capabilities for delivering services faster and continuously, and proactively welcoming new opportunities to achieve business advantage. The companies that will win in these information-led business models can innovate even as data grows unabated and budgets do not.

Balancing the needs of a future-ready enterprise with the obligation to lower risk, complexity and cost requires another dimension of IT efficiency and business acumen. The business-defined data center names IT as an accelerant for the forward-moving enterprise. Line-of-business owners are looking to the data center to be futureproof, reliable, adaptable and responsive to changes. Likewise, IT professionals understand that to meet business needs, data center technologies must be software-defined, automated, high-performance, nondisruptive, extensible and virtualized.

The rewards for doing what it takes to change? Organizations gain agility and adaptability to immediately respond to market trends and customer requests, as well as to exploit data sources for driving new business possibilities.

A New Kind of Infrastructure for a Changing World

With the right technology in place, companies have a better chance of satisfying immediate business needs and future growth. Hitachi Data Systems has been integrally involved in shaping how the business-defined data center will empower organizations to make smart choices for accelerating business. Because the always-on world is, well, always changing, Hitachi introduces the first business-defined IT architecture. Hitachi-powered continuous cloud infrastructure is a future-ready infrastructure that is agile, available, automated and acutely efficient. Always.

Hitachi-Powered Continuous Cloud Infrastructure

Built upon the powerful combination of advanced and innovative Hitachi technologies, continuous cloud infrastructure from Hitachi Data Systems enables business and IT leaders to embark upon new opportunities. These enterprises will not be held back by technology limitations or overrun by information. Instead, they will unconditionally innovate. Whether for an enterprise private cloud or scalable computing environment, Hitachi-powered continuous cloud infrastructure provides a trusted foundation that is:

Always Agile

Always being agile demands a single platform for all workloads to accelerate time to value. Software-led practices foster a choice of hardware to meet changing business requirements. Upgrades happen in place without disruption or frequency. Integration with key business applications and rapid deployment of new technology are the norms.

Always Available

Availability equates to no downtime, no disruption, no matter what. Always being available creates active-active environments and eliminates services interruptions. Labor-intensive, costly migrations are replaced with fluid data mobility between tiers, systems and sites. This higher rank of reliability breeds confidence to quickly roll out fresh initiatives or support new data streams.

Always Automated

Always-automated infrastructure uses built-in intelligence and tools to detect changing conditions and optimize assets. Automation promotes lower operating expenditures (opex) and alleviates manual intervention. Performance issues and bottlenecks correct themselves and data is moved to the right tier at the right time according to business-based policy. Automation dials down complexities to encourage applications-aligned management and service level attainment.

Enable Business Acceleration

Continuous cloud infrastructure exudes deep levels of IT efficiency to do more: faster, easier and economically. Capitalizing on existing hardware resources and technologies, such as storage virtualization and unified computing solutions, and enabling next-generation strategies like self-service customization encourage business resiliency and improved TCO. Hitachi-based continuous cloud infrastructure removes the typically heavy IT burdens to pave the way for greater productivity, market share and business value.

The Technologies Necessary to Transform

Hitachi-powered continuous cloud infrastructure includes the following technologies:

Hitachi Virtual Storage Platform G1000 (VSP G1000)

The next-generation in the evolution of superior Hitachi storage architecture VSP G1000 provides unprecedented performance and availability, and scales with zero downtime. VSP G1000 is software-centric for native functionality. It provides in-system scalability for seamless growth and unified storage for all enterprise strategies, and it reduces the need to layer appliances and tools for simpler infrastructure. The platform is intended for enterprise-level, mission-critical applications and for environments required to dynamically scale and perform for the long haul.

Hitachi Storage Virtualization Operating System (SVOS)

SVOS supports enterprise capabilities that maximize cost-performance needs, deliver built-in active-active* storage, and provide consistent functionality. Pervasive software intelligence allows SVOS to deliver all the necessary functionality for reliably hitting specific enterprise cost-performance targets. It supports 100% availability demands, virtualization of hardware assets and automated performance management. The operating system supports built-in active-active storage over multiple data centers without appliances, and provides the flexibility to choose hardware technology.

Hitachi Unified Compute Platform (UCP)

UCP provides the highest levels of efficiency, agility and resilience. Ideal for meeting new business-driven data center objectives, UCP brings together a unique blend of must-have technologies. These converged infrastructure solutions combine best-in-industry storage, server, networking and software management in fully integrated packages for accelerating applications and business value. From greater virtual machine (VM) density, nondisruptive operations and error-free template provisioning to rapid deployment and ubiquitous automation, UCP solutions are validated and certified for application-optimized reference or turnkey operation.

Hitachi Command Suite

Command Suite simplifies storage management, aligns with business policies and facilitates self-service customization. Capable of deep integration across the Hitachi portfolio, Command Suite increases operational efficiencies by simplifying management and correlating to business requirements. Command Suite features personalized management for end users through self-service customization and business policy alignment. It comprises a comprehensive suite of advanced tools that centralize, automate and expedite IT requirements.

Data Protection

One cohesive strategy combining advanced and unified data protection and high availability technologies, data protection safeguards data and applications throughout the Continuous Cloud Infrastructure. The broad portfolio of Hitachi data protection technologies are proved to remove risk from expanding information stores and new application initiatives. Hitachi data protection meets requirements for active-active scale out storage, high availability, zero recovery point and time objectives (RPO and RTO) and changing user needs.

The Tangible Benefits of Continuous Cloud Infrastructure

As separate components, the Hitachi technologies within the Continuous Cloud Infrastructure deliver on many of the enterprise IT demands. Collectively, they unite as a cohesive framework for equipping the enterprise to be future-ready and innovative. Continuous Cloud Infrastructure facilitates lower opex costs and better utilizes capital expenditure (capex) resources, via tremendous performance and capacity scale. Capacity efficiency comes into play with the consolidation of multiple islands into Hitachi platforms within the Continuous Cloud Infrastructure. In this way, previously stranded or underutilized assets can be pooled and mutually share the advanced technologies to extend the useful life of investments. Upgrades, data movement, and accommodating new growth happen without disrupting business operations. Automation and common management free up administrative time and promote better use of the data center for meeting business goals.

The tangible benefits of Continuous Cloud Infrastructure include:

Improved Productivity Across the Data Center

Improved productivity across the data center is critical in the information economy of the 21st century. Business leaders depend on instant access to relevant data for highly accurate decision making. Continuous Cloud Infrastructure can rapidly make that access possible, helping to curate all the elements of efficient yield:

- Manageability of all data formats for meaningful information output.
- Integration across platforms and applications to optimize assets.
- Fluid data mobility between tiers, systems and sites, with policy-based automation.
- Mitigation of stubborn management complexities and subsequent costs.

Faster Time to Market and Faster Deployments

The breadth of competition and the attention span of consumers are rousing new reasons to get products and services to market earlier. Organizations must swiftly deploy enabling technologies to improve business velocity. Continuous Cloud Infrastructure champions the need for speed without taking unnecessary risks:

- Control and centralize product data across development processes.
- Optimize how information is shared to improve processes and shorten cycles.
- Improve consistency across launch phases and delivery channels.
- Profit from new data streams and business initiatives.
- Promptly adapting to changes in business direction, scope and timetables.
- Meet unexpected market conditions and maintain competitive advantage.
- Rapidly deploy new technologies.
- Choose hardware that will better meet changing requirements; choice is enabled thanks to the agility of a software-led approach.

Highest Quality of Service: Forever

Data is starting to live forever and the very existence of many businesses depends on 24/7 availability. Providing guarantees on the ability to predictably and consistently deliver services is especially important for the new generation of Internet applications, such as video-on-demand, VoIP and other consumer services. Continuous Cloud Infrastructure helps deliver the highest quality of service forever with:

- Outstanding data protection with high-availability technologies, built-in active-active storage and no need for clumsy appliances.
- Zero downtime with nondisruptive migrations and upgrades for always accessible, highly responsive data centers.
- Manageability of growing data volumes without being limited by geography or scaling complexity.
- Ability to meet or exceed service level agreements (SLAs), increasing application requirements and overarching business objectives.

Industry-Leading Efficiency

Unprecedented increases in efficiency are required to move past just keeping the lights on. Efficient solutions with increased automation mean more available investment in revenue-generating IT activities and lowering total cost of ownership (TCO). Continuous Cloud Infrastructure promotes industry-leading efficiency with:

- Greater use of existing hardware resources through storage virtualization, dynamic tiering and automation,
- Personalized management capabilities through self-service customization and business policy alignment.
- Less time spent on IT and more focus on application needs and business readiness.
- Better aptitude for cost-efficiently expanding the foundational elements of private cloud: consolidating, virtualizing and automating infrastructure.

Economically Superior Architectures for Lower TCO

In considering IT economics, Hitachi Data Systems identifies the key ingredients of economically superior architecture. They include virtualization, dynamic thin provisioning, dynamic tiered storage, 3-D scaling, application-centric converged systems and common management, along with other advanced technologies. (More detail in a subsequent section.) Continuous Cloud Infrastructure exploits these traits to:

- Achieve lowest TCO by reducing opex costs and better utilizing capex resources.
- Deliver tremendous performance, and capacity scale and efficiency.
- Extend useful life and improve return on assets.
- Streamline deployment and remove potential for human error.

Real-World Use Cases

In a business-defined data center, being able to meet and accelerate business goals usually starts with addressing underlying IT urgencies. Some of the most pressing reasons for using Continuous Cloud Infrastructure to fast-track business innovation and growth include:

Storage Capacity

“My business is growing fast. I need to add storage resources frequently to keep up with new application demands and protect a growing data pool.”

Traditional backup solutions and scaling frameworks are no longer adequate for meeting data growth demands. Business-defined data centers need to be able to grow indefinitely without limitations. Hitachi-powered Continuous Cloud Infrastructure provides tremendous capacity to scale for today, tomorrow and beyond, as well as a unified data protection strategy. Industry-leading scalability supports over 2,300 2.5” disks. Knowing that storage hardware infrastructure can scale and perform for the most critical applications enables organizations to have confidence moving quickly into new initiatives.

Storage Performance

“My application performance requirements just keep growing. I need the highest performing storage media for business-critical apps and to leverage existing infrastructure.”

Business applications require dynamic changes including maximum performance characteristics to deliver faster access to data and to accelerate applications. Hitachi-powered Continuous Cloud Infrastructure delivers unique accelerated flash technology that scales to more than 600TB to meet even the most demanding application service levels. Hitachi Accelerated Flash provides lower cost-per-bit density than traditional flash methods and exudes highest flexibility to mix performance disks. Organizations are free to use flash as part of the overall storage performance strategy or to go “all flash.”

Storage Efficiency

“I need better efficiency of storage capacity to reduce TCO, improve utilization rates, and align data with business value.”

Business-driven data centers benefit from being able to extend the useful life of assets and better utilize capital resources. Storage virtualization and consolidation help to shed typical silo sluggishness and optimize data mobility across existing multivendor storage. Hitachi-powered Continuous Cloud Infrastructure dynamically and automatically moves data to the right tiers based on business-driven policies and varied disk profiles. This process reduces disk costs by over 30%, while enabling upgrades-as-you-go for longer useful life of assets.

Shared Storage Services

“I need to support many different storage formats, protocols and application requirements and still reduce costs.”

Leveraging one platform for all data alleviates many of the costs, complexities and risks that accompany so many IT requirements. Hitachi-powered Continuous Cloud Infrastructure facilitates that streamlined foundation for managing across SAN, NAS and object-based assets, unifying with a common management interface. Businesses can more adeptly meet multitenancy requirements and quality of service levels with a unified platform for all data types and applications.

Environmental

“I need to reduce environmental costs in the data center.

On a cost/TB/year basis, power and cooling tend to represent from 15% to 30% of storage TCO, and floor space up to 8%. Reducing power consumption and floor space in the data center go a long way toward reducing costs. Hitachi-powered Continuous Cloud Infrastructure encompasses highly efficient technologies and footprints to improve environment efficiencies by 55% over industry baselines.

Compute Converged Solutions

“My data center supports large complex environments. I need robust compute resources to support them.”

Business-driven data centers usually need to support faster application time to market for everything from VMware to SAP and Oracle. Ensuring end-to-end integration of storage, network, server and software and high levels of automation help reduce application deployment activities, improve data protection, leverage existing resources, and simplify ongoing management. Hitachi-based Continuous Cloud Infrastructure includes highly automated and fully interoperable converged infrastructure designed for mission-critical workloads and streamlined application deployment without manual intervention.

Private Cloud

“I need to implement on-demand storage and compute infrastructure that allows me to better control and deploy resources.”

For business planning to implement cloud within the enterprise firewall and under complete control of the IT department, the need for well-designed methodology is critical. The business-driven data center is able to leverage existing investments while preparing to leverage hybrid cloud in the future. Hitachi-based Continuous Cloud Infrastructure provides an efficient, reliable pathway to transforming the data center and modernizing cloud services. Hitachi technologies deliver cloud-ready capabilities and proven workload-specific converged infrastructure that foster security, compliance, better utilization and dexterity. The organization can better address the growing needs of internal customers and end users, while cost-effectively architecting for the future.

Public Cloud

“We’re looking to move some data offsite for long-term data protection and better TCO.”

When the enterprise looks toward public cloud services, the expectation is for external service providers to handle implementation, availability and safeguarding of the business data. Resources are made available to enterprise users via the Internet. Hitachi Cloud Services provide customers with a higher echelon of proven, cloud-ready technologies and services while delivering the exceptional flexibility and financial benefits of public cloud.

Hybrid Cloud

“I’m looking for the best of both worlds, with onsite and offsite storage resources.”

The business-driven data center ensures that varying application requirements and dynamic workload demands are met. Hitachi Data Systems combines its private cloud solutions and consulting services with its public Hitachi Cloud Services to provide a true hybrid cloud offering from a single vendor. By combining private and public cloud models, the enterprise is best able to meet performance, cost, protection, efficiency and business value objectives.

Data Protection

“My international business needs high availability regardless of GEO.

For the enterprise with data centers in various metro areas or on different continents, the need is the same: highest levels of data protection and availability. Application failover must be nondisruptive. Recovery times and recovery points require zero downtime. Hitachi-based c Continuous Cloud Infrastructure exploits a broad portfolio of data protection technologies without the need for clumsy appliances. Higher availability, with built-in, active-active storage and nondisruptive migrations, removes limitations of geography and downtime.

Data Migration

“I need to transparently migrate data across systems and locations.”

The business-driven data center does not consent to migration downtime or business disruption. Alleviating these challenges requires a system that, once in place, can be refreshed, scaled and upgraded without disturbance to application environments. Hitachi-powered Continuous Cloud Infrastructure eliminates migration disruption from generation to generation, and between vendors in SAN or NAS.

Application Integration and Performance Management

“I need to reduce storage management cycles and activities.”

IT organizations are looking to automate as many storage endeavors as possible to save time and money while meeting specific application requirements and performance goals. Storage management operations need to align to business policies and be automated to reduce complexity and speed application deployment. Hitachi-based Continuous Cloud Infrastructure employs expansive software intelligence to deliver best-in-class automation and alignment across storage systems, protocols and cloud resources.

Common Storage Management

“I need to simplify management of all my storage resources and protocols from one interface.”

The enterprise managing an accumulation of silos, systems and consoles is also paying for the software licensing and administrative training to support it all. Continuous Cloud Infrastructure provides overarching common management of all storage to extend IT capabilities. Visibility across resources via a single view helps streamline management, support self-service customization endeavors, and increase operational efficiencies.

A Few Important Notes on Services

Hitachi Data Systems Global Services has a breadth of experience turning technology capabilities into measurable business gains. With a complete suite of consulting, transition and management services, the Hitachi Data Systems Global Services organization is a united ecosystem of the industry’s most proficient consultants and partners. For the enterprise committed to accelerating what IT can accomplish for the business, Hitachi offers managed cloud solutions,

cloud enablement methodology, business analytics, and much more. The following are highlights related to capitalizing on Continuous Cloud Infrastructure.

Active-Active Environments

Hitachi Data Systems has pioneered the first active-active storage capability, which is built into the enterprise storage controllers. Unlike other vendor products that bolt on these features with costly, complex and scale-challenged appliances, Hitachi active-active environments encourage simple, high availability, scale-out functionality. The benefits include nonstop computing, improved disaster recovery and overall business continuity. Hitachi Data Systems Global Services provide expert guidance on planning and designing business continuity strategies that leverage active-active capabilities. This support is ideal for environments that demand global data protection with zero downtime and instant failover.

Nondisruptive Migration

The days of labor-intensive, costly migrations with phased or planned downtime are numbered. Business-driven data centers need high availability with zero downtime for migrations and upgrades. Nondisruptive migration services from Hitachi target the planning and migration of the desired end state. They then work back to ensure a smooth process with minimal risk or cost. There is no disruption to the business, no matter what.

Converged Solutions

Combining IT components, including servers, networking, storage, compute and software, into a single entity or solution promotes better efficiency. Converged solutions enable IT to pool and share resources, simplify and centralize management of those resources, and significantly improve cost savings. Most converged infrastructure is just that: infrastructure. Hitachi converged solutions are fully integrated best-in-industry packages intended to improve the resiliency, efficiency and agility of the IT organization. These solutions can extend past the infrastructure to encompass management services for a complete approach to supporting the business-driven data center (think: deploy quickly, benefit faster).

The Role of IT Economics

The economics of IT are changing right along with evolving business directions and requirements. While the needs to justify purchases and leverage investments continue to stand the test of time, organizations are seeking new ways to measure value of technology to business. In the last 13 years, Hitachi Data Systems Storage Economics has had an extensive and successful record of helping over 1,500 organizations identify and capitalize on the long-term value of storage purchases. With engagements across continents, industries and IT environments, Storage Economics has helped organizations realize an average of 25% cost reductions in the first year, and sustained savings over time.

Today's business-driven focus requires a new basis for measuring what matters. To meet business goals, getting in front of IT challenges is critical. Having the right technologies in place increases business intelligence and innovation while cutting away cost inefficiencies.

*Separately licensed feature available after initial release. Ask your HDS representative/partner for more information.

Hitachi Data Systems sees the role of IT economics as broadening the scope of what business-driven data centers must measure to maximize business acceleration. IT economics analyzes the entire technology stack to enable organizations to derive the greatest business value from IT. Some of the more meaningful metrics of the modern data center include:

- Total cost of ownership per terabyte.
- Total cost of ownership per application instance.
- Total cost of ownership per VM.

Hitachi IT Economics provides the framework and cost analysis to aid businesses in truly understanding the economic impacts of the right architecture, for deployments such as:

- Big data solutions.
- Private, public and hybrid cloud.
- Hypervisor and virtual desktop infrastructure (VDI).
- Converged infrastructure solutions.

Continuous Cloud Infrastructure as a Launch Point for Savings

To truly appreciate the benefits extolled in this paper regarding Hitachi-powered Continuous Cloud Infrastructure, Hitachi IT Economics illustrates them from an economic point of view. Specifically, IT Economics pinpoints the actual cost reductions associated with Continuous Cloud Infrastructure deployments. It evaluates these results, considering previous storage, key technologies and new business-acceleration opportunities.

Building on the Success of Superior Architectures

Traditionally, Hitachi has approached cost-efficient enterprise storage with the vision to reduce unit costs while improving bandwidth, connectivity and scalability. Building superior storage architecture starts with technologies that maximize value from current storage investments to better handle data growth, possibly slowing the need to purchase additional assets. These technologies include storage virtualization, dynamic “thin” provisioning, dynamically tiered storage, data deduplication, storage consolidation and integrated archiving. An important tenet of the economically superior Hitachi storage architecture is ensuring a foundation for high performance and scalability.

Built upon the principles of economically superior storage architecture, these enterprise platforms extend the IT organization’s ability to:

- Scale performance and capacity based on business need.
- Reduce administrative costs with simplified management.
- Move and tier data based on information value.
- Migrate in and out of new and existing platforms with ease.
- Do it all faster, cheaper and easier than with other products.

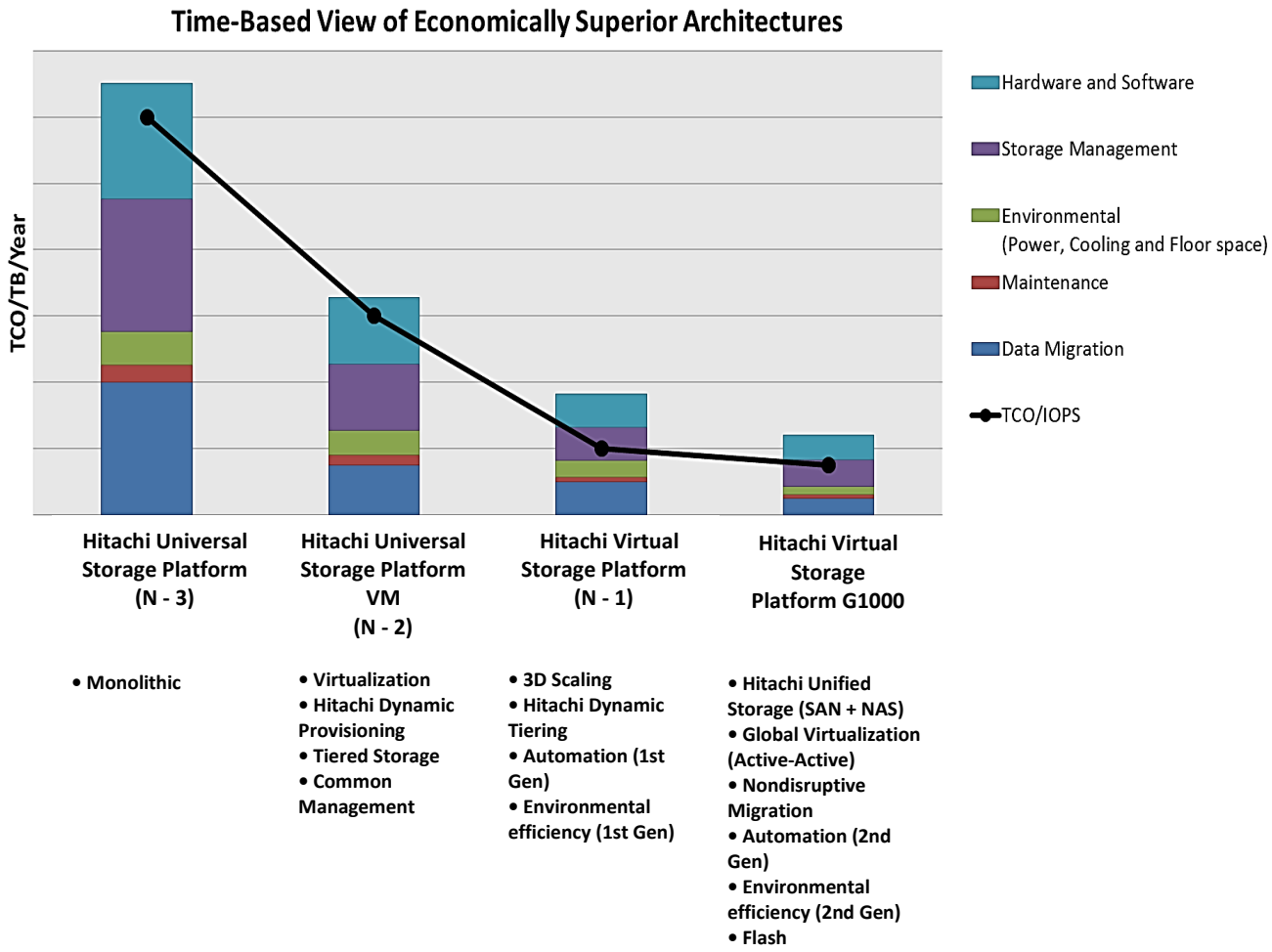
Cost Reductions of Continuous Cloud Infrastructure Versus Previous Platforms

Each generation of Hitachi architecture has typically improved over the previous generation (n-1), providing cost reductions.

- Hardware and software that unifies and consolidates: up to 25%.
- Maintenance with unified storage and consolidation: up to 25%.
- Labor with improved common management and automation: up to 20%
- Environmentals due to higher density, reduced power and cooling consumption: up to 50%.
- Performance capabilities with better disk I/O and better disk utilization: up to 60%.
- Migration with zero downtime and no disruption to business operations: up to 50%.

Figure 1 is time-based and illustrates these types of cost reductions by generation. The architectures compared are Hitachi Unified Storage Platform, Hitachi Unified Storage Platform V, Hitachi Virtual Storage Platform (VSP), and the new Hitachi Virtual Storage Platform G1000. VSP G1000 is a key component in Hitachi-based Continuous Cloud Infrastructure.

Figure 1. Historical View of Economics



A closer comparison between the latest generation of Hitachi architecture and its immediate predecessor highlights significant progress in technological capabilities and corresponding benefits (see Table 1).

Table 1. Comparison of Next-Generation Improvements

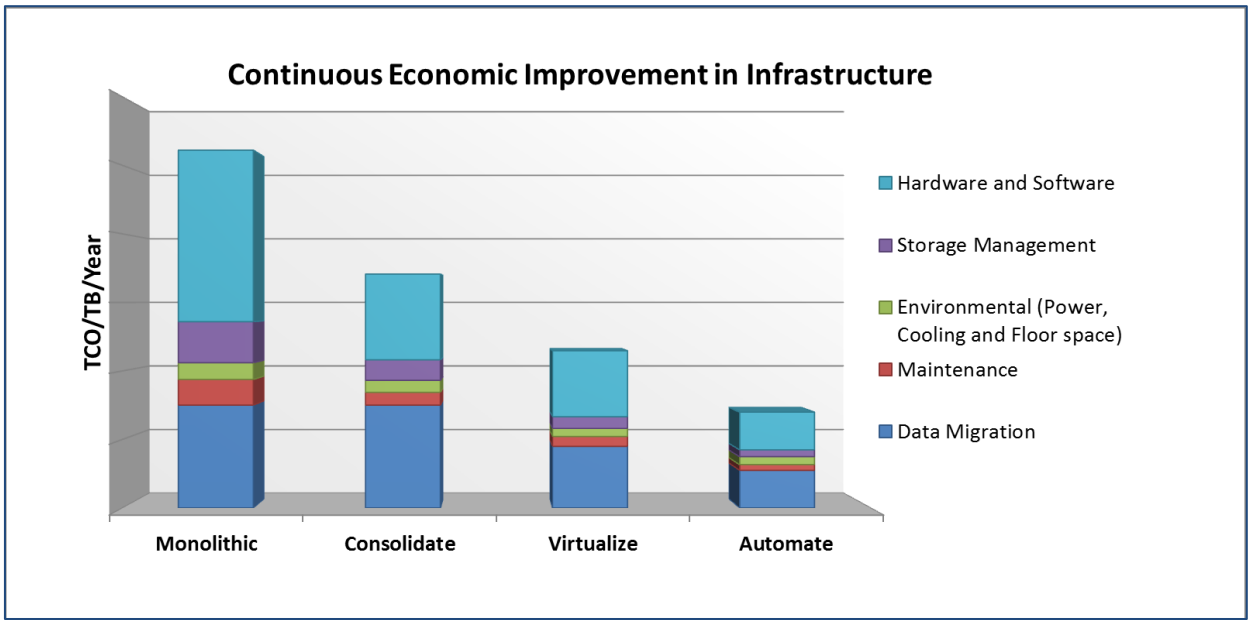
	Hitachi Virtual Storage Platform	Hitachi Virtual Storage Platform G1000	Improvement
Maximum (Max.) Total IOPS	1M+	3M+	3X
Max. Internal GB/sec	192	800+	>4X
Max. Virtual Storage Directors	8	16	2X
Maximum Processor Cores	32	128	4X
Maximum Cache	1TB	2TB	2X
Max. System Power Consumption (with max 2.5" HDD count)	.02 KVA per 2.5" HDD	0.016 KVA per 2.5" HDD	Approx. 25% Improvement
Move To Faster Hardware	Migration	In-place Upgrade	Improved ROI

HDD = hard disk drive, ROI = return on investment

Cost Reduction by Continuous Cloud Infrastructure Technologies

Evaluating cost reductions by technology rather than between systems affords customers a phased approach to achieving lower TCO. For example, an organization with monolithic systems can incrementally improve cost savings by moving first to consolidation technologies, then to virtualization, then to automation. Or, they can go through all the phases at once (See Figure 2).

Figure 2. Cost Reduction by Technology Phases



TCO = total cost of ownership, TB = terabytes

So, when comparing the technologies inherent in Hitachi-powered Continuous Cloud Infrastructure with the traditional storage platforms still using non-virtualization or thick provisioning functionalities, the cost improvements are substantial:

Consolidation, going from many to a single system, reduces TCO by 35% over traditional storage, and promotes:

- High capacity (highest scale).
- Flash drives (do not need separate flash system).
- Unified storage (do not need separate NAS system).
- Common management (manage from one place)

Virtualization, pooling physical storage to manage as one system, reduces TCO another 30%, and provides:

- Improved storage management across heterogeneous IT environment.
- Better storage utilization rates.
- Greater capacity efficiency (external virtualization and tiering).
- Extended useful life of assets (zero downtime, nondisruptive migrations).
- Reduced environmentals (power, cooling, floor space).
- Alleviate geographic scaling limitations with global active-active storage.

Automation, eliminating manual intervention for performing tasks, reduces costs by another 40%, and facilitates:

- Decrease administrative overhead (do more with fewer resources).
- Enhance resiliency and data protection (removal of human error).

Look at Lower Application TCO

To continue supporting the always-changing business requirements of its customers, Hitachi IT Economics has been evolving what to measure and why. Understanding what is important for the business-driven data center to succeed, in part, entails that the organization consider, measure and analyze new metrics. Not all technology may contribute directly to cost reductions, yet it is still crucial to meeting an SLA or new business requirement. For example, a particular reference architecture or storage platform that is preconfigured, tested and certified may provide the most expedient path to cost-effectively deploying a specific application. In this scenario, measuring storage would not make sense, but assessing reductions of cost, time and effort to deploy the application would be appropriate.

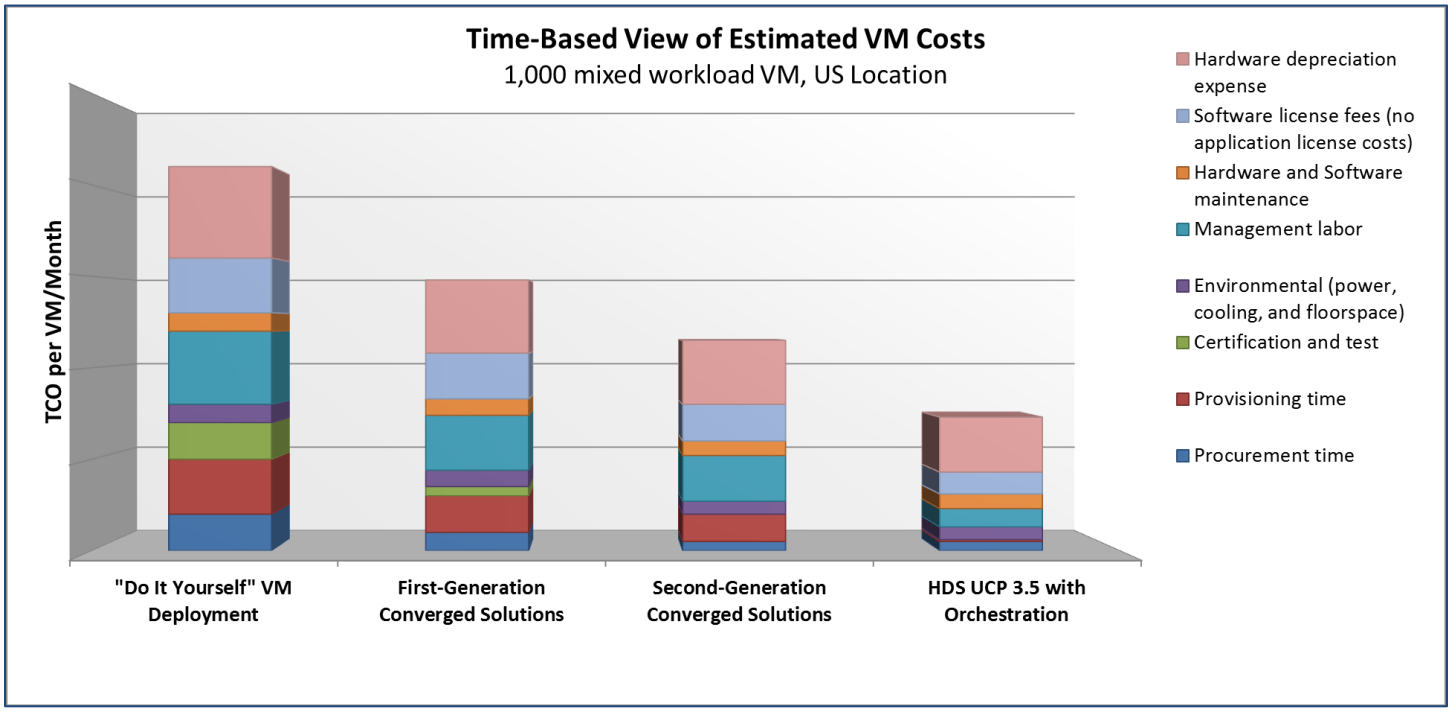
Table 2 and Figure 3 highlight new views of how HDS solutions reduce costs. Table 2 follows the evolutionary path of VM deployment, from the do-it-yourself stage through to complete orchestration, and the jumps in unit cost reduction with each stage. Figure 3 extrapolates out the cost reductions in a time-based manner by calculating the TCO savings per VM per month. This application view to cost reduction is critical to understanding how superior architectures reduce costs all the way to the end user.

Table 2. Evolution of VM Deployment

Stage	Characteristics & Qualities	Cost Reduce From Previous: Why?
VM "Do It Yourself"	• First move from physical servers.	• Physical to virtual move allowed better server utilization.
	• Used available servers and disk to build.	• 4:1 virtual machine (VM) density was common.
	• Started as proof of concept, then moved to production.	• Existing servers multiplied into many more VMs.
1st Generation of Converged Infrastructure	• Vendors prepackaged kits of server, network and storage.	• Single SKU made procurement and CMDB much easier.
	• Single rack delivery, some tested and certified.	• Some sizing and packaging reduced up-front certification time.
	• Single vendor support.	• Better environmentals due to optimized components.
	Up to 30% Unit Cost Reduction	
2nd Generation of Converged Infrastructure	• Advanced storage options (virtual, thin, tiered) integrated into converged infrastructure and offloading of process from server to storage CPU via API.	• Higher VM density with API off-load.
	• LPAR for RISC workloads to move to Intel without hypervisor.	• Lower cost for growth.
	• Uses existing assets, no waste.	• Production in days versus weeks.
	• Ability for scale-up and out.	• More reduction in Hardware to provide same VM performance and load.
	• Certified/tested solutions for application workload (SAP, Microsoft® SQL Server®).	• Secondary benefit to reduce/move RISC costs in IT.
	Up to 20% Unit Cost Reduction	
Orchestration	• Tight integration with VMware vSphere.	• Single point of provisioning, and self-provisioning now possible.
	• Single instance and heterogeneous elements.	• Staff time and effort shrinks.
	Up to 20% Unit Cost Reduction	

LPAR = logical partition, RISC = reduced instruction set computing, SKU = stock-keeping unit, CMDB = configuration management database

Figure 3. Time-Based View of VM Costs



VM = virtual machine

Final Notes

In this paper, Hitachi Data Systems has demonstrated how Continuous Cloud Infrastructure can help even the most dynamic enterprise overcome the challenges of change. The tenets of Hitachi-based Continuous Cloud Infrastructure, always agile, available, automated and efficient, lay the foundation for business acceleration and innovation. With the right technology in place, the future-ready business quickly gains a foothold on solid economic ground. New ways to measure economic efficiency and business value support opportunities for future growth and success, regardless of change. Be prepared for the always-on, always-changing world, no matter what.

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