

WHITE PAPER

Reducing Complexity and TCO in Virtualized Environments with a Highly Flexible Storage Architecture

Sponsored by: Fujitsu

Yasusuke Suzuki

May 2011

IN THIS STUDY

With the global economy moving towards recovery, enterprises around the world are working to improve their management lest they fall behind the times. Effective utilization of IT is one of the most important competitive axes in these reforms. It has two significant implications. The first is that enterprises making aggressive use of IT increase their competitiveness; the second is that there must be improvements in the efficiency of IT operations to prevent the costs associated with expanded IT utilization from ballooning out of control. Looking at this from the perspective of data management, the question is how an enterprise is able to collect, link large volumes of data and improve the data quality and how quickly and cost-effectively the data can be processed, stored and retrieved.

For above requirements, enterprise users have achieved significant gains in IT operational efficiency by introducing server virtualization. When it comes to storage, however, most enterprises have yet to find a good way to resolve the confusion, and in some cases storage has emerged as a source of complexity or as an annoying factor driving operational costs higher. In short, storage infrastructure is one of the most important challenges remaining in enterprise IT reforms, and people have begun to focus on transformation of storage infrastructures.

This white paper contains observations on the significance to shift to more efficient and flexible IT infrastructure, featuring storage. It goes on to discuss the value of using the Fujitsu ETERNUS DX S2, a storage platform with rich flexibilities, as storage infrastructure that provides a basis for storage management of virtualized environments, and needn't be said, private clouds.

SITUATION OVERVIEW

Changing IT requirements

A number of different changes confront enterprises. Changes in the industrial structure and globalization are among the most significant social developments to be addressed. While there are some trends that are unique to individual industries, large numbers of enterprises are experiencing changes in the competitive landscape from M&A and the emergence of new competition from new entrants crossing sector lines.

Current changes are characterized by their high speed and large amplitude. On the speed point, one must note the quickness with which smart phones, other mobile devices, and social media have spread compared to the time required for the penetration of durable goods in the past, for example, TV sets, VTRs and personal computers. The size of the change is best illustrated by the Lehman Brothers collapse

of 2008 in which financial engineering triggered a recession that went far beyond normal economic cycles, and also by the skyrocketing prices for petroleum and other materials. One of the factors accelerating these changes is IT. The development of the Internet has reduced the cost of acquiring and distributing information while dramatically increasing the speed at which information is processed and propagated. As people and companies learned how to exploit those new capabilities of IT, social systems shifted into a new phase. Ironically, social changes triggered by IT have forced changes in enterprise IT systems seemingly with each cycle of the spiral.

In the past, common practice for internal enterprise systems was to optimize individual systems to perform their work as efficiently as possible. This was an effective strategy for a society in which the pace of change was moderate. When the frequency of system changes is low, it is more important to seek productivity in daily operations than to worry about the costs of future change. However, individual optimization is not all good to all situations. Systems tend to become too firmly fixed and siloed, and enterprises that maintain many of them see their operations become extremely complex and the fundamental changes become despairingly difficult.

The pursuit of system performance and optimization were justified when the priority was on the productivity of individual operations. They are no longer valid in today's world to adapt to social changes that are mentioned earlier. The orientation has shifted in favor of the flexibility, extensibility, and agility of systems. For example, in industries like finance, healthcare, and manufacturing where M&A is common, corporate acquisitions have become a regular and repeated occurrence. A backlog is created if too much time is required to integrate the systems of a single acquisition, because the next acquisition occurs regardless of completion of system integration. Flexibility and extensibility are crucial for the smooth integration of systems. From the perspective of the acquired enterprise too, the ease of system integration and their degree of system standardization have emerged important evaluation points in the M&A due diligence process.

The emergence of the Internet and web services has triggered innumerable innovations in business models and business processes. Not a few enterprises find themselves in competition with new entrants from sectors that they never imagined. In these circumstances, enterprise systems must not only achieve availability and performance, but must also have the flexibility to be able to adapt to new business requirements in a short period of time and at a reasonable cost. Indeed, with growing number of IT products providing availability and performance with reasonable cost, the focus in product differentiation has shifted to the flexibility. IT system should not be the rate-determining step when adapting to change and is expected to be the source of enterprise competitiveness to address new business requirements more quickly than the competition.

The growing demand for IT infrastructure virtualization

There is another reason why enterprise users have begun emphasizing the flexibility of systems: the major advances in virtualization technology to support enterprises and organizations adapting to a rapidly changing world. There has been a synergy between business needs and new technology development that has triggered the current transition to virtualized environments.

There are two important points to move forward with the virtualization of IT infrastructure and the implementation of private clouds. The first and more obvious is

that virtualized environments are appropriate mechanisms for achieving flexibility, extensibility and agility in IT. The use of virtualization technology is an effective, realistic solution to increasing the competitiveness of corporate IT systems.

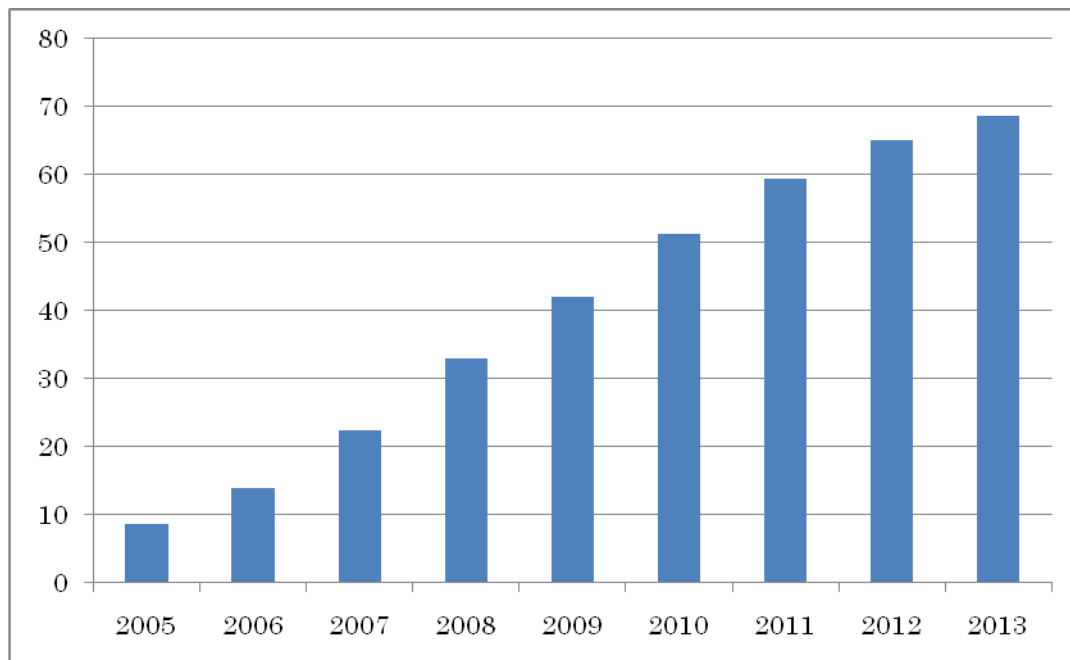
The other point is that the operating costs of existing systems must be reduced in order to secure the funding required to develop and implement new IT system for business viability and competitiveness, and the introduction of virtualization technology is the most effective means of cutting down conventional operating costs. It should be noted that the cost impact of the transition to virtualized environments goes beyond the reduction of operating costs for existing systems. It also impacts development costs. There is a significant difference in cost between purchasing new servers and storage at the onset of a new development project and temporarily configuring servers and storage from a virtualized resource pool. Furthermore, larger differences should be recognized when one considers reusability of resources after the project is complete.

The State of Virtualization in Today's Datacenters

IDC research indicates enterprise datacenters are rapidly virtualizing many types of workloads. In 2010, IDC estimates just over half (51.3%) of workloads will be virtualized, rising to over two-thirds (68.6%) by 2013 (see Figure 1). Organizations are deploying virtualization to reduce costs, to increase business flexibility, and to reduce power and cooling consumption.

FIGURE 1

Worldwide Installed Workloads Virtualized, 2005–2013



Source: IDC Survey: Virtualization Management Maturity — A Prerequisite for Cloud (Doc #223671 / Jun 2010)

While many early virtualization programs focused on the simple consolidation of server workloads, IDC increasingly sees organizations embracing virtualization to improve business continuity and service performance. The ultimate goal for many of these organizations is to enable highly dynamic and efficient operations that can match computing resources to workload requirements in real time, based on changing business needs.

We have now reached the stage where people share a consensus on the utility of virtualization of IT infrastructures and the desirability of moving in this direction. The reality, however, is that front lines of IT administration still have anxieties and issues with the actual practice of virtualized infrastructure operations. In the next section, we discuss the findings from an IDC user survey to identify what IT administrators consider to be important in the management of virtualized environment.

User challenges in virtualized IT environment

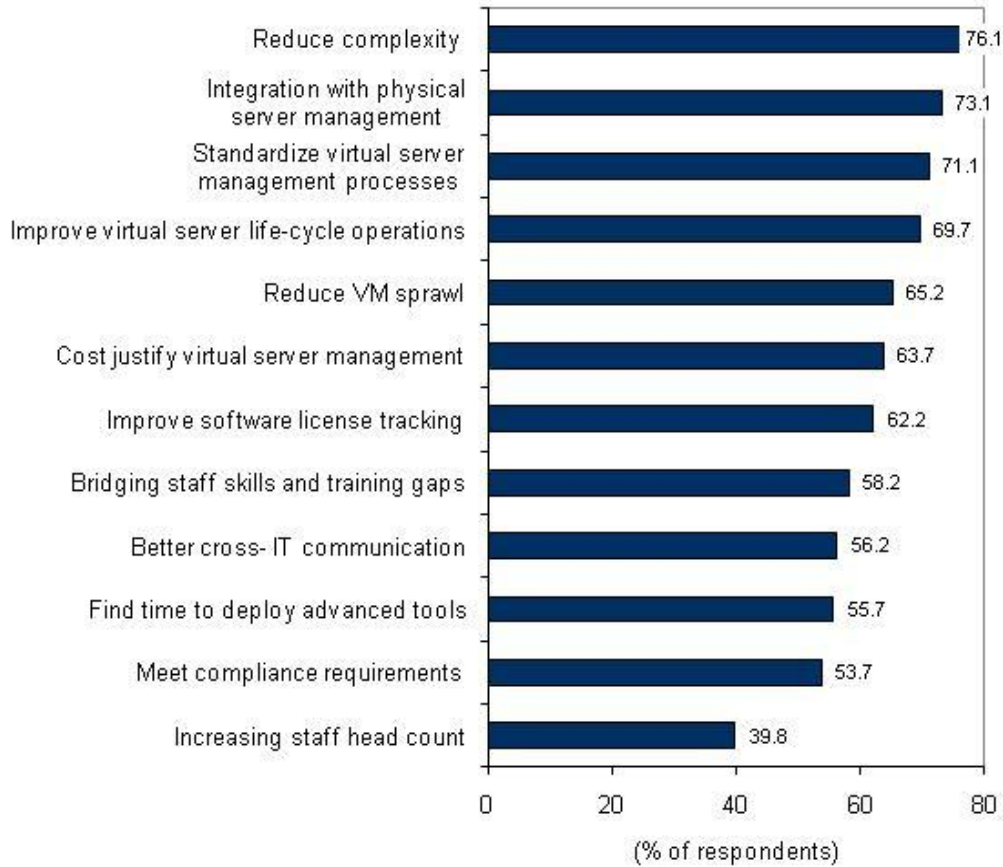
The survey data indicates that reducing complexity (76.1%) is the top priority among survey participants — both those that currently deploy system management software tools for virtual servers and those that do not (see Figure 2).

IT infrastructure management is complex and has many aspects, but one of which is a trouble shooting issue. Adding in a layer of virtualization software increases convenience, but also means that IT administrators find it more difficult to closely monitor the status of the hardware covered by that layer. On the server side, virtualization software frees managers from having to worry about the impact of differences in hardware configuration, but on the storage side, there remains a heterogeneous environment because there is no comparable industry-standard OS.

High complexity translates into high operations costs. An excessive variety of tools, excessive increase in numbers of technicians or operation workload is not desirable from the perspective of operations risk management either. In terms of cost, the larger the number of virtual machines, the more apparent the I/O traffic problems and the more necessary the use of high-end, namely expensive, storage products. Storage costs burgeon, in direct contrast to servers, which have become increasingly commoditized in virtualized environments.

FIGURE 2

Virtual Server Management Capabilities Considered Most Essential over the Next Two Years



n = 201

Source: IDC, Jun 2010 Insight (Doc #223551) "Survey Says: Virtual Server Management Priorities Focus on Reducing Complexity"

Fujitsu ETERNUS DX disk storage system for virtualized IT environment

At the product launch of ETERNUS DX S2, the second generation of the ETERNUS DX disk storage systems, Fujitsu introduced a concept of 'Flexible Data Safe' for unlimited data growth and rock solid data protection. In today's digital era, managing and administering fast growing business critical data is the most essential need in every organization. Under the 'Flexible Data Safe' concept, Fujitsu ETERNUS storage systems have been enhanced with the intention of managing the potentially unexpected growth and offering organizations assurance of the highest business continuity and data integrity, eliminating performance and bandwidth bottlenecks. ETERNUS DX is also efficient in energy consumption, minimize floor space, simplify management, delivering the flexibility for future requirement in enterprise storage infrastructures.

Another and important value proposition of ETERNUS DX S2 is that Fujitsu developed the second generation of ETERNUS DX disk storage systems as a solution to the operational difficulties posed by server virtualization environments. Fujitsu ETERNUS has a broad portfolio of hardware and software products, and ETERNUS DX is able to cover everything from the entry level to midrange and large enterprises, enabling the creation of integrated storage infrastructure geared to specific user environments.

Figure 3 illustrates the main features articulated by Fujitsu for the ETERNUS DX S2. It positions the ETERNUS DX S2 as reliable storage platform for the future. Fujitsu's aim is not to provide just a "best of breed point solution" for storage that offers specific, distinctive features, but rather to offer a comprehensive product that satisfies the common requirements of an integrated platform and meets a broad spectrum of needs.

FIGURE 3

Fujitsu's Design Concept of ETERNUS DX S2

Safety	<ul style="list-style-type: none"> ✓ Proven capabilities ensure business continuity and Data replication among entry, mid-range and enterprise storage ✓ Build-in data integrity and encryption keeps all data safe
Performance	<ul style="list-style-type: none"> ✓ The fastest disk storage system is now even faster ✓ Bandwidth more than doubled for future networks and convergence
Efficiency	<ul style="list-style-type: none"> ✓ Minimal administration efforts and efficient operation ✓ Green storage with minimized power consumption and less floor space
Compatibility	<ul style="list-style-type: none"> ✓ Innovative and flexible system architecture across the entire family ✓ Fit for all important usage scenarios

Source: Fujitsu, 2011

Practical functions of ETERNUS DX S2 for virtualized environments

In this section we look into the functions of the ETERNUS DX S2 and what they mean for users. We will examine them in terms of the main features of ETERNUS DX S2 .

Safety

The Safety capabilities of ETERNUS DX S2 ensure business continuity at an affordable price, even for smaller businesses. Data safety is guaranteed thanks to built-in data integrity such as pre-emptive detection and elimination of hardware failures, as well as system cross-checks. To protect sensitive data from unauthorized access even at the end of the system's lifetime, for example during recycling, encryption technologies are an integrated part of the system architecture.

The entry-class DX80/DX90 S2 supports RAID6 as well as the mid-range DX400 S2. This protects data from dual disk faults in the RAID HDDs and both improves the reliability of data protection and reduce costs by enabling the use of high capacity oriented, but lower cost Nearline SAS HDDs, for critical data that must be protected. Normal practice in the industry is for high-end products to combine high levels of availability, performance, and reliability as a "set." There are, however, some applications in which it is absolutely necessary to avoid data loss, but availability and performance are not so important. The flexibility of the ETERNUS DX S2 ensures that users will be able to invest efficiently when meeting such requirements.

Performance

In the first generation of the ETERNUS DX series, Fujitsu had already targeted top of the class performance as a dual controller midrange disk storage system. The ETERNUS DX S2 provides innovative enhancements to this. One of the product features is the use of Intel Xeon chips for the storage controller. The use of industry standard server components should help shorten development terms and enable timely upgrades to the latest performance as new CPUs become available. This design methodology protects user investments well into the future.

ETERNUS DX S2 supports automated management functions for tiered storage, including the SSD layer, and therefore it is possible to dynamically allocate SSD use to applications that require heavy I/O traffic. I/O performance can be further boosted by adding more SSDs as required, which should provide users with an avenue of flexibility for future enhancements.

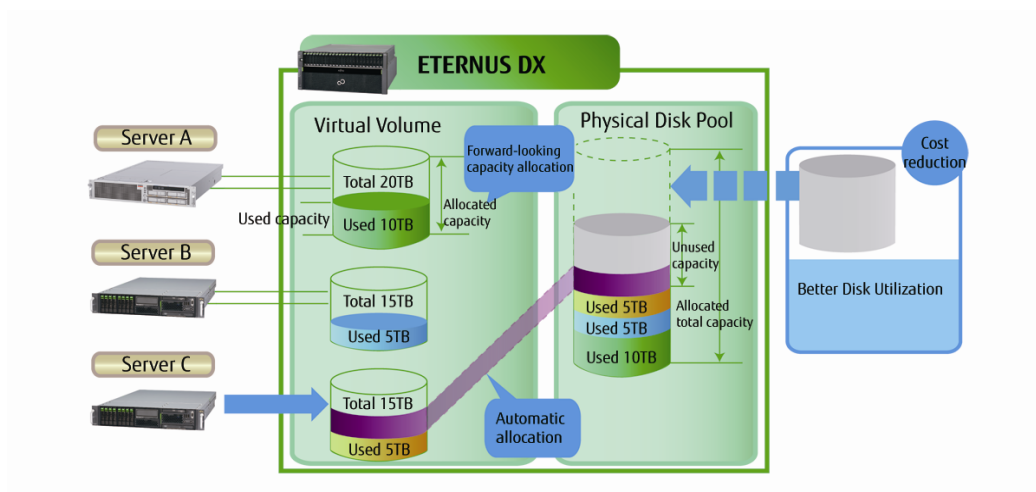
Efficiency

The ETERNUS DX S2 offers easy management that enables operation management with fewer human resources and makes efficient use of other resources (capacity, electricity, floor space) too. These objectives are achieved with thin provisioning and an "eco-mode".

Thin provisioning: Using low physical disk capacities to allocate large-volume virtual disks to servers. This helps with capacity planning where Nearline SAS HDDs the requirement is to ensure the maximum volume envisioned for the individual applications, without having to deploy lots of unused disk space. In fact the probability of the worst (maximum volume requirement) cases simultaneously occurring is extremely low, and preparing capacity for the case that could hardly happen is wasteful. Thin provisioning increases the usage rate of storage volume, which leads more efficient operation. It also makes capacity planning easier by visualizing physical disk capacity usage and monitoring threshold values (see Figure 4).

FIGURE 4

Thin Provisioning

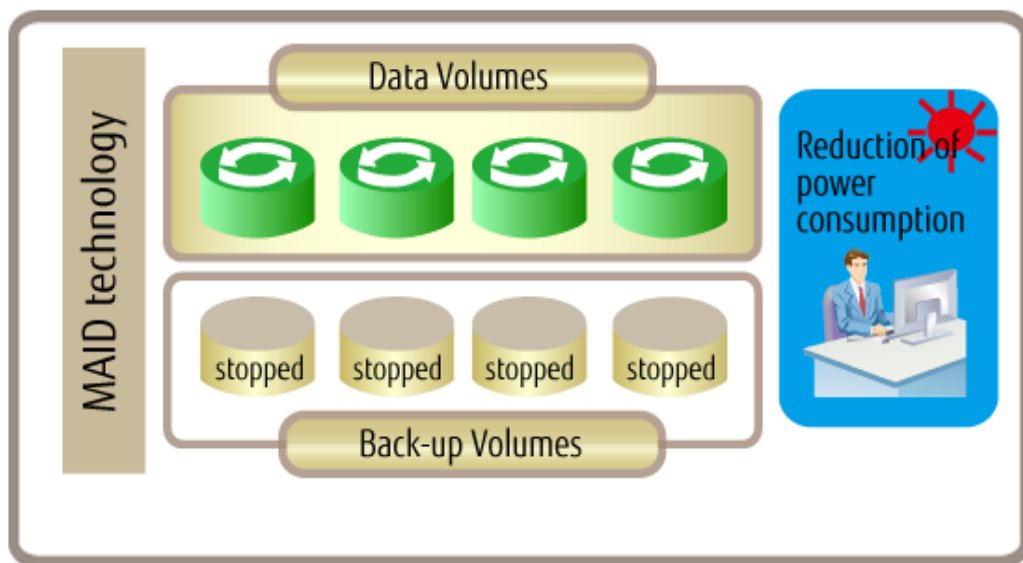


Source: Fujitsu, 2011

Eco-mode: ETERNUS DX S2 includes functions to spin down HDDs when access frequencies are low. This is an energy-saving function that is sometimes referred to as "Massive Arrays of Idle Disks" (MAID). Spin down can be scheduled, or can be adaptive according to access patterns. It is an effective function for maintaining the accessibility of long term retention data, and the effects can be maximized by making use of automated storage tiering in combination (see Figure 5).

FIGURE 5

Eco-mode: Power-saving operation based on the MAID technology

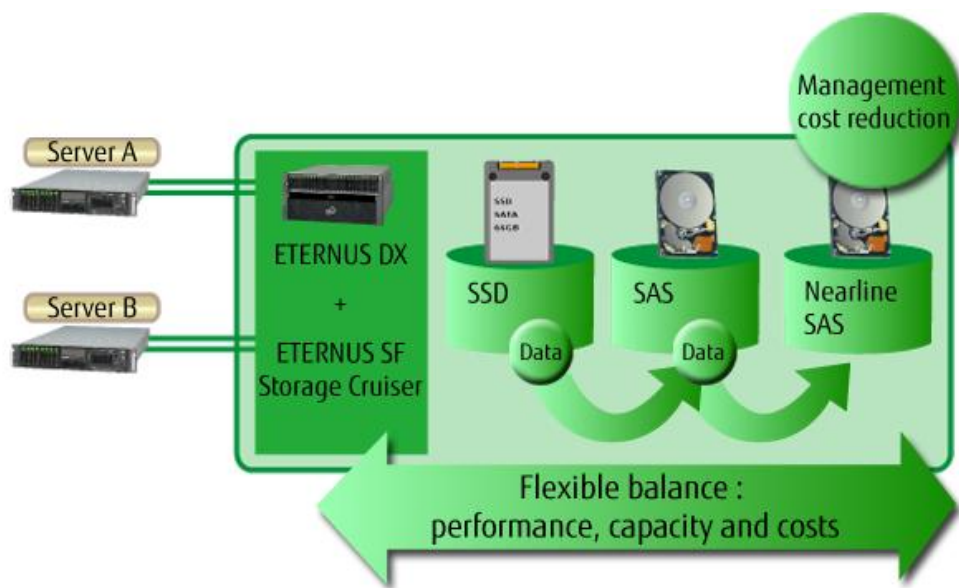


Source: Fujitsu, 2011

Automated Storage Tiering: ETERNUS SF V15 Storage Cruiser enables monitoring of access to the individual logical units (LUN) of the ETERNUS DX S2 and also auto-migration of LUNs among storage tiers according to access frequency. This translates to a significant reduction in management costs compared to manual migrations and also enables more efficient disk usage. In mid term this functionality will be enhanced in terms of automated storage tiering on sub-LUN base (see Figure 6).

FIGURE 6

Automated Storage Tiering



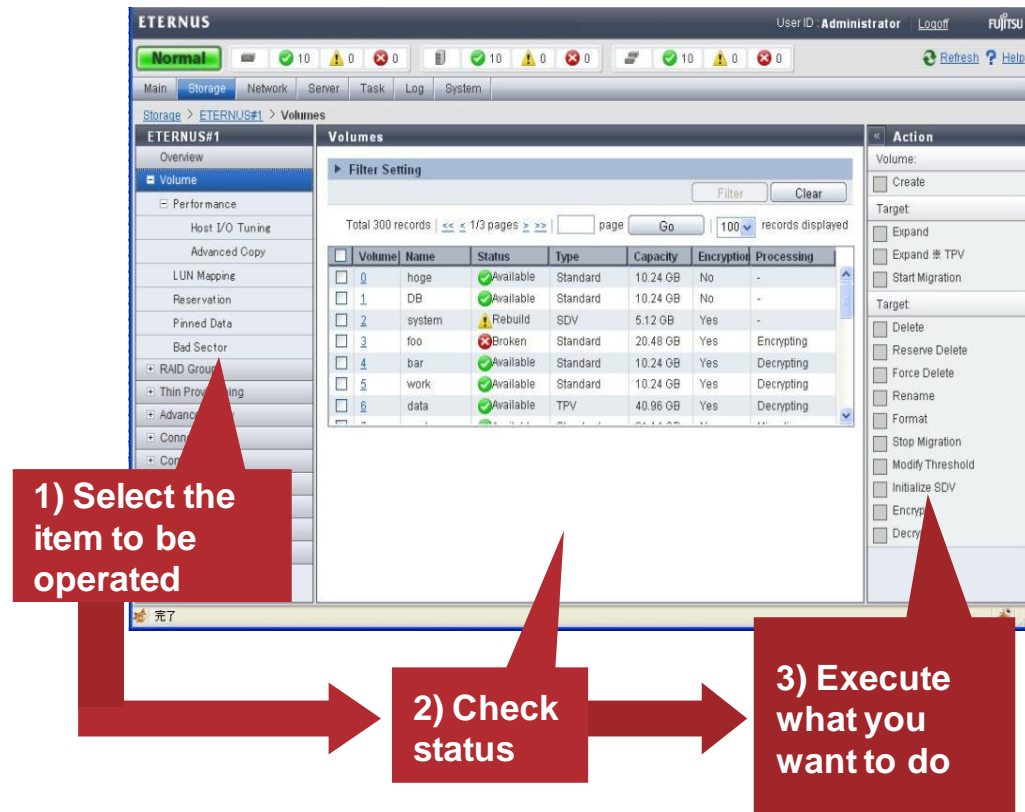
Source: Fujitsu, 2011

Visualization of server virtualization environments: An important function of the ETERNUS SF V15 Storage Cruiser is the monitoring and visualization of storage system operations in server virtualization environments (see Figure 7).

When failures occur, the system quickly identifies the state of the failure part and the VM guests that will be impacted, displaying this information on a GUI and providing visual representation of the entire chain from the storage device to the VM guest. This provides smooth support for trouble shooting, one of the major factors in management complexity.

FIGURE 7

ETERNUS DX ONE GUI Management



Source: Fujitsu, 2011

Compatibility

IDC believes that the most important feature of the ETERNUS DX S2 is its system family compatibility with a flexible internal architecture that commonly extends from the entry class to the enterprise class. It is fundamentally different from attempting to integrate storage products with different architectures at the management tool level, in which the skills and experiences of administrators must be used to make up for variances in the performance behavior of individual architectures. Clearly, a common single architecture has the benefit of reducing the burdens on IT managers. The intuitive operability offered by a single GUI also better facilitates information collection, settings, control, and monitoring. ETERNUS DX S2 has been tested with a large number of server vendor products and operating systems. Particular emphasis in the server virtualization environment has been on verifying compatibility with VMware, Microsoft Hyper-V, and Citrix Xen. By promptly supporting compatibility with VMware vStorage APIs for array integration (VAAI), the ETERNUS DX S2 product family delivers a compelling value proposition. The ETERNUS series, with its broad product portfolio, is also suitable as an integrated storage platform because all models provide the same function set according to a various Service Level Agreement (SLA).

Business opportunity and changes for Fujitsu ETERNUS DX S2

From above discussions, IDC believes ETERNUS DX S2 will win many users for its features and their ability to satisfy all requirements as an integrated storage platform while offering users a major advantage in the reduction of storage TCO. The flexibility of its architecture well matches requirements of this dynamically changing era. One additional user benefit is credibility for an operational stability and the future holistic prospect of Fujitsu's solutions. Most users want to avoid any drawbacks, for example, a decline in operational reliability even if only temporary, from the introduction of virtualization technology and the creation of an in-house private cloud. The management tools and professional services provided by Fujitsu addresses these anxieties, preventing the emergence of invisible portions caused by the insertion of the virtualization layer. That makes it a solution in which customers can have confidence, and that confidence earns it high marks. Most users put weight on storage as a big influencer to total system costs, operational efficiency, flexibility, and reliability, and IDC believes that Fujitsu's ETERNUS DX S2 storage will see greater business opportunities by fulfilling those trends of requirements. The factors in its favor include confidence in one's ability to protect the investment of enterprise users by building and extending systems while maintaining consistency and continuity achieved by wide ranges of Fujitsu products and services throughout their IT offering (servers, storage, middleware, networks).

The challenge for Fujitsu as a provider of storage solutions is to increase its brand recognition. Users who list up vendors specializing in storage solutions as candidates when considering thoroughgoing storage standardization tend to emphasize the vendor's experience and practices in system connectivity and failure identification in multivendor server environments. It will be important for Fujitsu to establish a presence in the storage market by actively promoting its connectivity track record with other-vendor server environments so that users who do not use Fujitsu servers will still consider it as a primary candidate for an integrated storage platform vendor.

Copyright Notice

External Publication of IDC Information and Data — Any IDC information that is to be used in advertising, press releases, or promotional materials requires prior written approval from the appropriate IDC Vice President or Country Manager. A draft of the proposed document should accompany any such request. IDC reserves the right to deny approval of external usage for any reason.

Copyright 2011 IDC. Reproduction without written permission is completely forbidden.