“Hitachi Simple Modular Storage 100,” Simple and Reliable Low-end Disk Array

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OVERVIEW: Amid growing concern regarding compliance and business risks associated with in-house corporate IT systems, data holdings of SMB customers are burgeoning and there is growing demand for external disk arrays that can be easily connected to systems. There is also a great need to reduce the work involved in storage management and operations to lessen the workload on IT system managers who have come under increasing pressure. To meet these needs, Hitachi recently brought to market a low-end disk array that is suited for SMB and departmental storage needs. The Hitachi Simple Modular Storage 100 is an entry-level disk array system that is so simple and user-friendly that the end-users are comfortable installing, operating, and maintaining the system themselves. Setup and configuration are so easy that it takes less than an hour from unpacking to actual recognition of the array by the server using Hitachi’s exclusive configuration wizards. Operations and maintenance have also been carefully conceived and implemented to minimize the burden on system managers. The Hitachi Simple Modular Storage 100 is implemented with RAID-6 and redundant support for all key components, thus ensuring uncompromising reliability and availability for SMB clients.

INTRODUCTION

THE ability of in-house IT (information technology) systems to deal effectively with compliance and business risks has become increasingly important in recent years, and certainly systems for SMB (Small and Medium Business) are no exception. Meanwhile, the data holdings of companies are burgeoning, and there is a rapidly growing need for external disk arrays that can be quickly and easily incorporated into a company’s system. At the same time, we are seeing increasing pressure and responsibility put on IT systems managers — particularly in small to medium-sized firms that have relatively small workforces — and individual managers are often saddled with enormous workloads, so there is also a growing need to reduce the burden that falls on IT systems managers involved in managing and operating storage systems.

To address these issues, Hitachi has now extended its lineup of array systems with the Hitachi Simple Modular Storage 100, a robust low-end disk array that is optimally suited for SMB and departmental storage needs (see Fig. 1). This paper gives an overview of the affordable entry-level Hitachi Simple Modular Storage 100 for small and medium-sized companies, highlighting the disk array’s key features and capabilities.

DESIGN FEATURES OF THE HITACHI SIMPLE MODULAR STORAGE 100

Conceived as an external storage appliance that is so user-friendly and easy to use that systems managers can handle all aspects of its operation, the Hitachi Simple Modular Storage 100 is conceived as a highly reliable entry-level disk array with a particular emphasis on ease of use. Here we will highlight some of its key advantages.

Simple Installation

In contrast to mid-range and high-end disk arrays where the client typically purchases system configuration services along with the hardware, purchasers of lower end disk arrays with a more modest price point often opt to configure the array themselves, so it had to be implemented in a way that users can install and set up the array themselves. To help in this regard, the Hitachi Simple Modular Storage 100 is available in 10 preset models covering a range of different storage capacities and come with all required

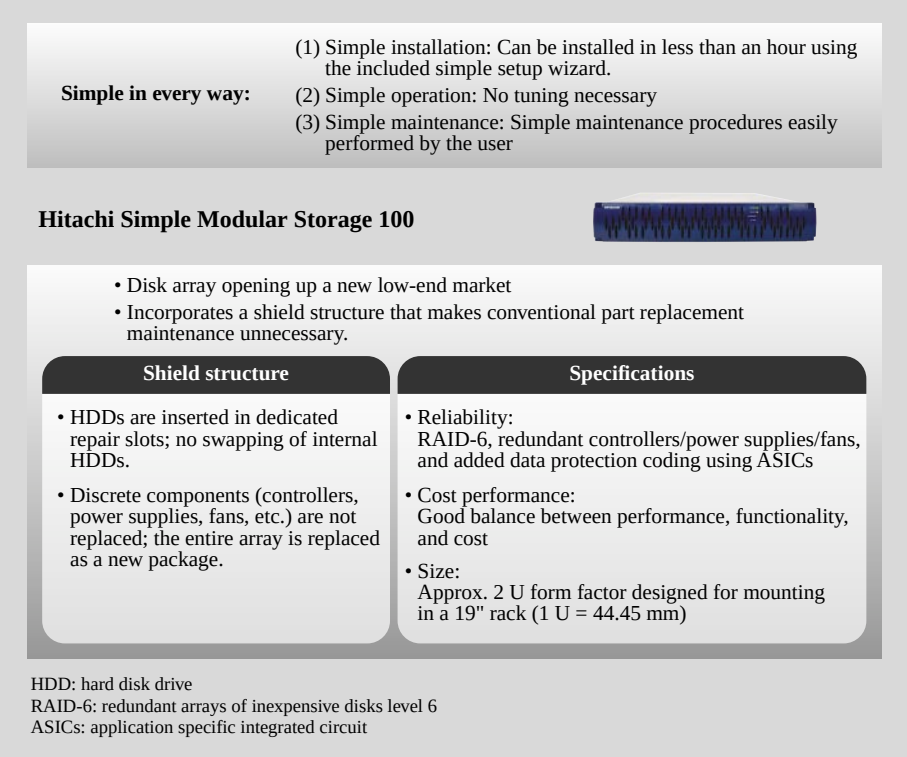

Fig. 1—Overview of Low-end Disk Array Hitachi Simple Modular Storage 100.
Extending the company's lineup of enterprise-class and mid-range disk array systems, Hitachi, Ltd. recently added the Hitachi Simple Modular Storage 100, a low-end disk array for SMBs. The Hitachi Simple Modular Storage 100 is not only simple to install, operate, and maintain by the user, it is also a very affordable entry-level disk array with a price tag of under ¥1 million.

components built in, so users are not faced with the difficulty of choosing optional equipment. And configuration and setup of the Hitachi Simple Modular Storage 100 could be easier using Hitachi's configurations and setup wizards, so that even someone with little or no storage expertise can set up the system with a few mouse clicks by following the onscreen instructions. Headaches associated in installation have all but been eliminated, and it takes less than an hour from unpacking to recognition of the storage by the host (see Fig. 2).

Simple Operation

With conventional disk arrays having a redundant dual controller configuration, the LUs (logical units) capable of accessing each controller were limited (controller LU ownership). When installing a new disk array, the user was thus faced with the daunting task of designing and configuring the access paths and LUs connected to servers and each controller with an eye to balancing various resource loads.

The Hitachi Simple Modular Storage 100 features a new capability called active/active controller to eliminate this preliminary design work. The active/active controller supports two key capabilities: symmetrical active/active controller and controller load automatic balancing.

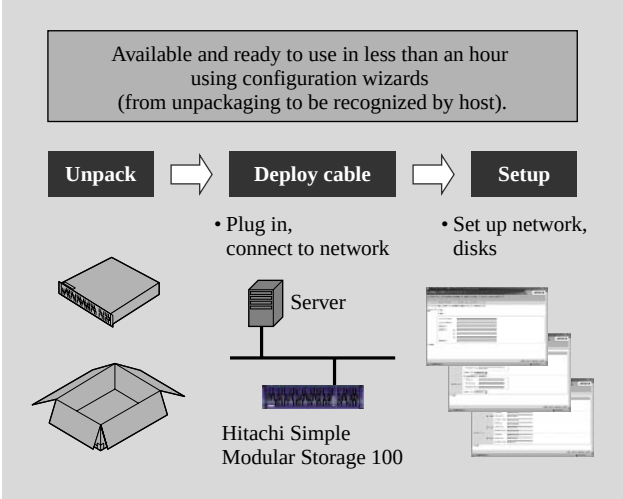

Fig. 2—Easy Installation Using Configuration Wizards.
From unpackaging to recognition by the server takes less than one hour with the user-friendly configuration wizards.

(1) Symmetrical active/active controller

Host path connection ports of each controller switch the access paths back and forth to accommodate LU numbers accessed by the hosts at very high speed, and this permits accessing of all LUs from any host path connected to the controller. Not only does this eliminate the complex system design consideration of LU ownership and access loads from each server, but

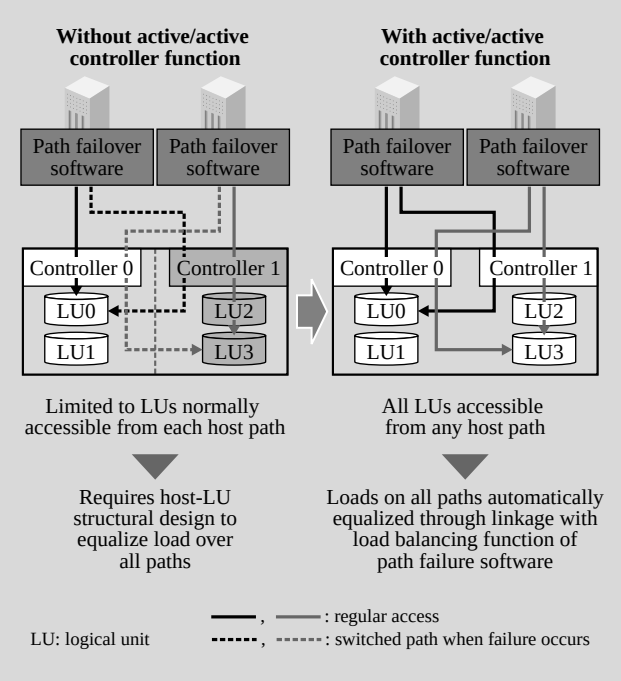

Fig. 3—Load Balancing Using the Active/active Controller. All LUs are accessible from any host path, and path efficiency has been optimized by the path failover software load balancing function.

linking with the capability of the path failover software to balance loads across multiple paths also enables optimization of host path efficiency (see Fig. 3).

(2) Controller load automatic balancing

In disk array operation in a real work environment, it is commonplace due to the nature of the work for accesses to concentrate on a particular LU thus creating a significant unbalance in the loads handled by the two controllers, and it is also common for this to dynamically change over a daily period or a weekly period. The Hitachi Simple Modular Storage 100 effectively deals with this situation by monitoring controller loads, and if a state of unbalance persists for a certain length of time, the LU experiencing a rate of accesses automatically switches over to the other controller with the low load to equalize the controller load balance.

These two powerful capabilities of the symmetrical active/active controller and controller load automatic balancing maximize the efficiency of all the system's resources from host initiator to the disk array controller without any system design efforts on the part of the user, and ensure continued automatic optimization in the face of future system changes and application load changes.

We have also made it much easier to exchange the control software (microprogram) incorporated in the array controllers to modify the active/active controller functions. In order to switch microprograms while the host remains up and running in the past, it required path failover software and the microprogram exchange had to be done after the user switched host paths. The Hitachi Simple Modular Storage 100 allows modification of LU controllers without path failover software, so microprograms can be exchanged without shutting down.

Simple Maintenance

When maintenance work needed to be done on disk arrays in the past, it has always been assumed that a maintenance technician called a CE (customer engineer) would be sent out by the vendor to do the work, and of course maintenance services are not provided free of charge. Maintenance on the Hitachi Simple Modular Storage 100 essentially only involves two elementary tasks — plugging a replacement HDD (hard disk drive) into a replacement slot on the front of the array or replacing a defective component such as a controller — both of which can be done very easily by in-house staff with little or no prior training or storage related expertise. Maintenance service by a certified CE is no longer necessary, which substantially reduces maintenance costs.

Long-term Warranty*1

The warranty period for the Hitachi Simple Modular Storage 100 is five years and two levels of support are available: standard basic support is included in the cost of the array (support is available from 9:00 am to 5:00 pm on weekdays) and the premium support is available at additional cost (support is 24 hours a day 365 days a year).

Exceptional Reliability

Hitachi Simple Modular Storage 100 is not only remarkably user-friendly and easy to operate, the solution also achieves exceptional reliability as storage media for corporate data by adopting the same robust reliability features of enterprise-class disk arrays including redundancy of key components, RAID-6 (redundant array of inexpensive disks level 6 provides additional protection of data with dual parity), and added data authentication codes (original checksums that are added to all data blocks for data reliability) implemented in ASIC (application specific integrated circuit).

*1 Note that these warranty terms are for the domestic Japanese market.

Affordable Host Interface over IP Network

The use of iSCSI (Internet small computer system interface) for the host interface offers a number of significant advantages: it permits continued use of the company's existing infrastructure, and enables companies to procure more cost-effective switches, routers, and other peripheral equipment that work over the IP (Internet protocol) network. While holding down costs, iSCSI also permits multiple hosts and disk arrays to be interconnected over the Internet, an approach that can flexibly accommodate any system configuration changes in the future.

HITACHI SIMPLE MODULAR STORAGE 100: NEW APPROACH TO MAINTENANCE

In this section we describe the Hitachi Simple Modular Storage 100's unique maintenance scheme in which damaged drives are replaced by inserting a new drive in a repair slot on the front of the array. Maintenance for the Hitachi Simple Modular Storage 100 essentially involves the following two types of procedures based on the malfunctioning part and nature of the problem that can be readily dealt with by the users themselves using the tech support capabilities available at the Hitachi Simple Modular Storage Support & Service website.*2

(1) Dealing with a failed hard disk drives

If an HDD fails in the disk array, the user accesses the Hitachi Simple Modular Storage Support & Service website, enters the error code displayed by the disk array and the address where the service part is to be sent, and the Service Center promptly sends the required service part (e.g. a replacement HDD). With the Hitachi Simple Modular Storage 100, there is no need to remove the damaged drive and replace it with the new drive. Instead, the maintenance work is completed as illustrated in Fig. 4, by merely inserting the new replacement drive into the repair slot on the front of the array. When the new drive is inserted into the Hitachi Simple Modular Storage 100, the system automatically begins the RAID group rebuild, and when that's done, redundancy is automatically restored. Note that the damaged drive inside the array is logically disconnected, so there is no need to actually remove the drive from the array.

The Hitachi Simple Modular Storage 100 comes with two repair slots, so redundancy can be restored using this same procedure for up to two failed drives. This repair slot approach adopted on the Hitachi Simple Modular Storage 100 represents a great improvement, for it completely eliminates all the cumbersome procedures associated with conventional disk arrays when an internal disk fails: removal of the damaged drive from the array, returning the damaged part to the vendor, etc. Moreover, with the repair slot approach, the user's data on the failed drive is never taken away from the customer's premises (or even out of the customer's disk array), and this too is an advantage in terms of data security and lessening the burden on the user.

Fig. 4—Inserting an HDD into a Repair Slot.
When a replacement drive is inserted into the repair slot on the front of the array, the RAID group is rebuilt automatically.

(2) Dealing with other failed components or a third failed HDD

Much the same as the procedure described above in (1), the user accesses the Hitachi Simple Modular Storage Support & Service website, and enters the error code displayed by the disk array and the address where the service part is to be sent. The Support Center determines what service part is required from the error code, and promptly delivers the replacement part to the customer.

In this case, the user has to switch over from the damaged systems to the new replacement systems, but the work of transferring the user's data and setup information over to the new systems is done automatically by an auto-migration function by simply following instructions on a simple graphical user interface management tool. Note that while the data is being migrated over to the new systems, work can continue on the hosts connected to the disk array. Once the data migration process is completed, the data on

*2 Note that this Hitachi Simple Modular Storage Support & Service website is intended for clients in Japan. For support and service outside Japan, please contact us by e-mail to helpdesk@hds.com or by phone to the HDS support desk at (1) 866-437-9467.

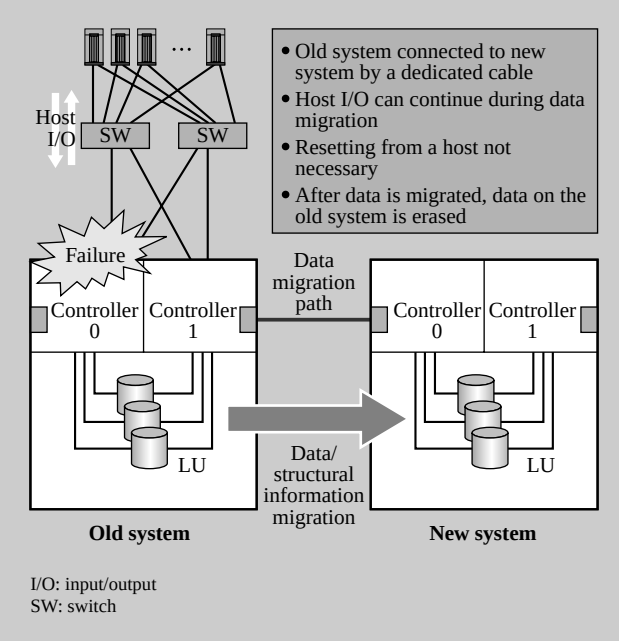

Fig. 5—Auto-migration of Data and Structural Information. Data is automatically migrated by following simple on-screen instructions, and work can continue on hosts connected to the disk array even while the data transfer is in progress.

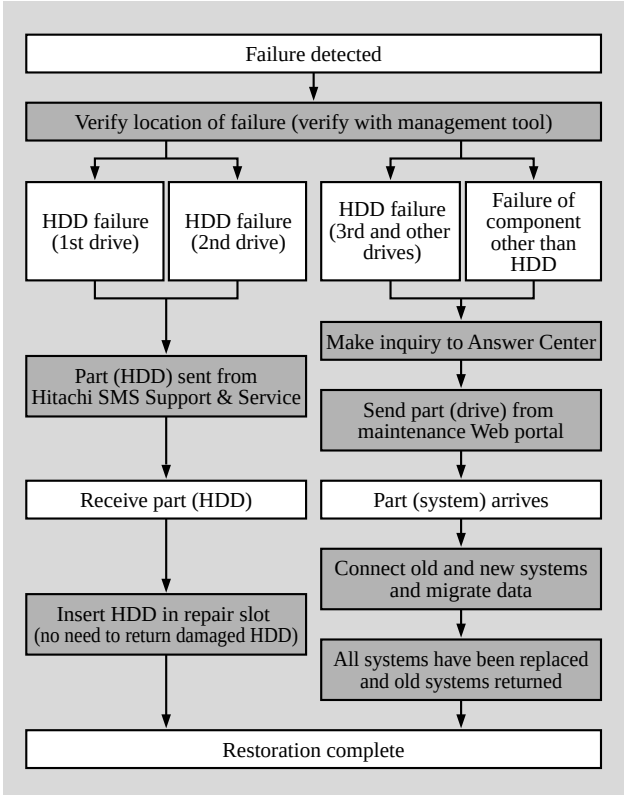

Fig. 6—Flow for Dealing with Array System Failures. Flow for dealing with system failures in maintenance operations is shown.

the old defective system is erased (see Fig. 5). After all data has been erased from the drive, the defective system is disconnected and sent back to the Support Center to complete the operation.

Fig. 6 shows a summary of the maintenance operation flow. One can see that with this approach, the users themselves are able to very easily deal with operations and maintenance situations without bringing out a CE. This allows the user to restore the company's data much more rapidly, and substantially reduce maintenance costs.

CONCLUSIONS

In this paper we presented an overview of the Hitachi's low-end disk array that is ideally suited for SMB and departmental storage needs. Building on the success of this platform, we plan to incorporate some of the key features of the entry-level Hitachi Simple Modular Storage 100 into Hitachi's mid-range and enterprise-class disk arrays, further enhance the auto-migration capabilities so entry-level clients can easily migrate their data to larger scale systems as their businesses grow, and develop a greater range of features improving the system's usability and availability.

REFERENCE

(1) "Hitachi Storage Solutions website," http://www.hitachi.co.jp/storage/

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