Hitachi Storage Management Software that Achieves the Best Operation

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OVERVIEW: In recent years, while the volume of data locked up in storage has been increasing non stop, a serious situation regarding a lack of human resources with the skill to operate and maintain this stored data has continued to worsen. With addressing this situation in mind, Hitachi is providing "storage-management software" that can simplify operation of storage while making it more efficient. Operation and management of storage involves a cycle of building, operation and monitoring, and response — where optimizing each step is the ideal. By assembling all the necessary products for each step of this cycle while simplifying storage management and effectively selecting the optimum storage in response to operational requirements in terms of performance and cost, Hitachi's storage-management software reduces the total cost of ownership (i.e. the sum total of installation cost, maintenance cost, management cost, etc.) incurred by customers. Added value is increased by providing software that can not only handle the building required in the initial step of the cycle but also functions form operation and monitoring up to quick response. Hitachi's storage-management software is a family of products based on the concept of "Services Oriented Storage Solutions" for simply managing Hitachi's diverse range of powerful disk array subsystems in a common manner from the viewpoint of solutions in tune with the storage operation cycle of customers. Being highly appraised as a unified product with excellent handleability in terms of ease of use in winning the Good Design Award is a feature of Hitachi's storage-management software based on the above concept.

INTRODUCTION

WITH the aims of utilizing technology of "integrated system management — JP1 (Job Management Partner 1)" and optimizing operational management of all resources in a SAN (storage area network)/NAS (network attached storage) environment (such as Hitachi's disk array subsystems, which are the world-leaders in the enterprise field), Hitachi's storage-management software was launched in 2002. Since then, aimed at providing "integrated storage solutions" tailored to the service systems of individual customers, eight products are currently offered (see Fig. 1).

Hitachi's storage management software for accomplishing optimum operation is described in the rest of this paper.

FEATURES OF HITACHI'S STORAGE-MANAGEMENT SOFTWARE

Device Manager

To simplify various operations for setting up storage hardware when establishing or expanding systems, unified management of several kinds of storage hardware (i.e. understanding of configuration information and setting up), disk management from the viewpoints of servers and services, and notification functions for fault occurrence and configuration changes are provided (see Fig. 2). Logic groups can be hierarchically defined in response to applications of particular users, and logic units of each storage domain can be allocated to group units.

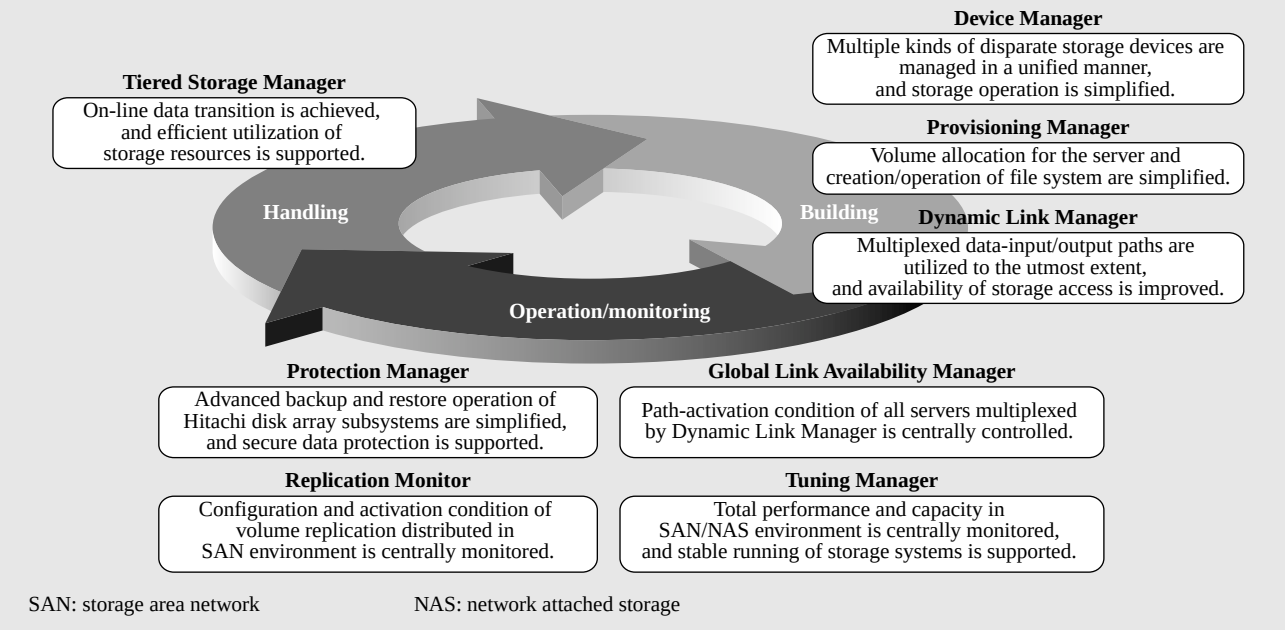

Fig. 1—Cycle for Optimum Storage Operation and Management.
Hitachi's storage-management software provides eight products for optimizing operation management of all resources in a SAN/NAS environment.

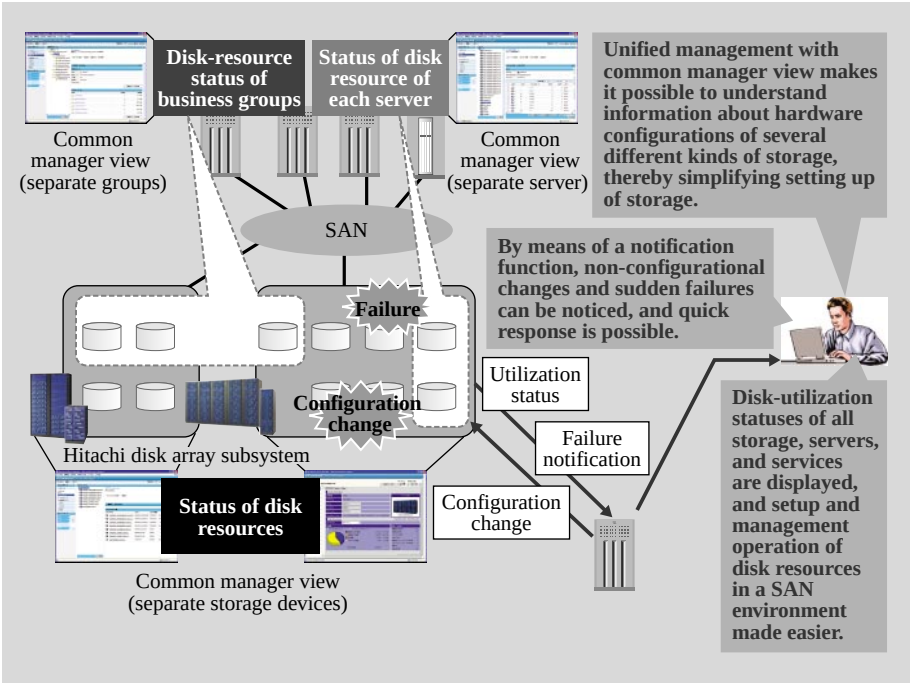

Fig. 2—Overview of Device Manager.
By allocating logic units of each storage domain to group units and supervising them, every kind of setup operation can be simplified.

Provisioning Manager

To simplify the operations for volume allocation to servers and allocation during expansion, distributed available volume is understood and managed as a storage pool. By understanding volume from a unified viewpoint of performance and cost, it is possible to efficiently use storage resources (see Fig. 3).

Dynamic Link Manager

By automatically performing load sharing (i.e. load balancing) of input/output paths to storage and switchover during failures (i.e. "fail-over"), it is possible to improve access performance, availability, and operability in regard to Hitachi disk array subsystems.

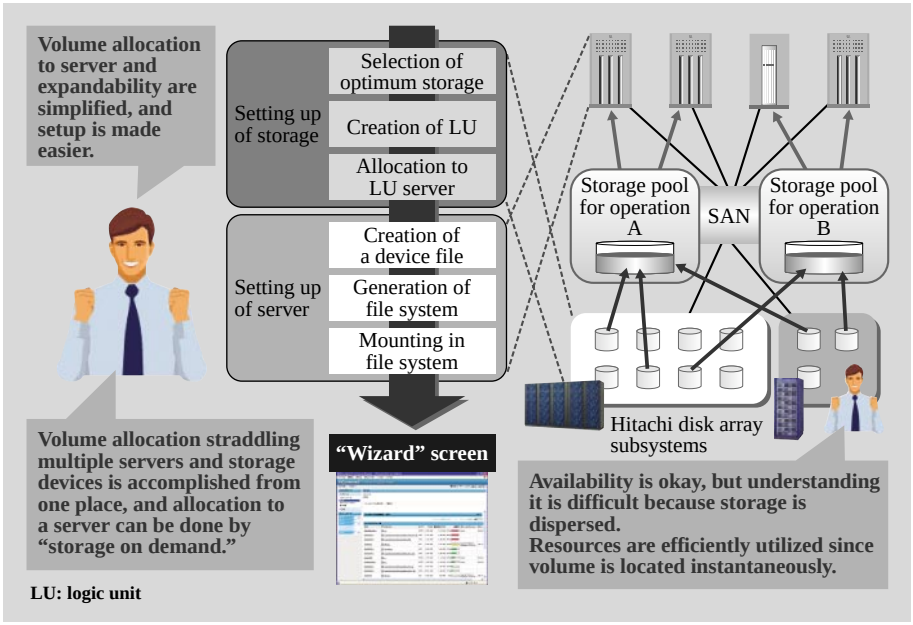

Fig. 3—Overview of Efficient Use of Storage Resources.
Usable volume distributed here and there is managed as a storage pool, so storage resources are utilized efficiently.

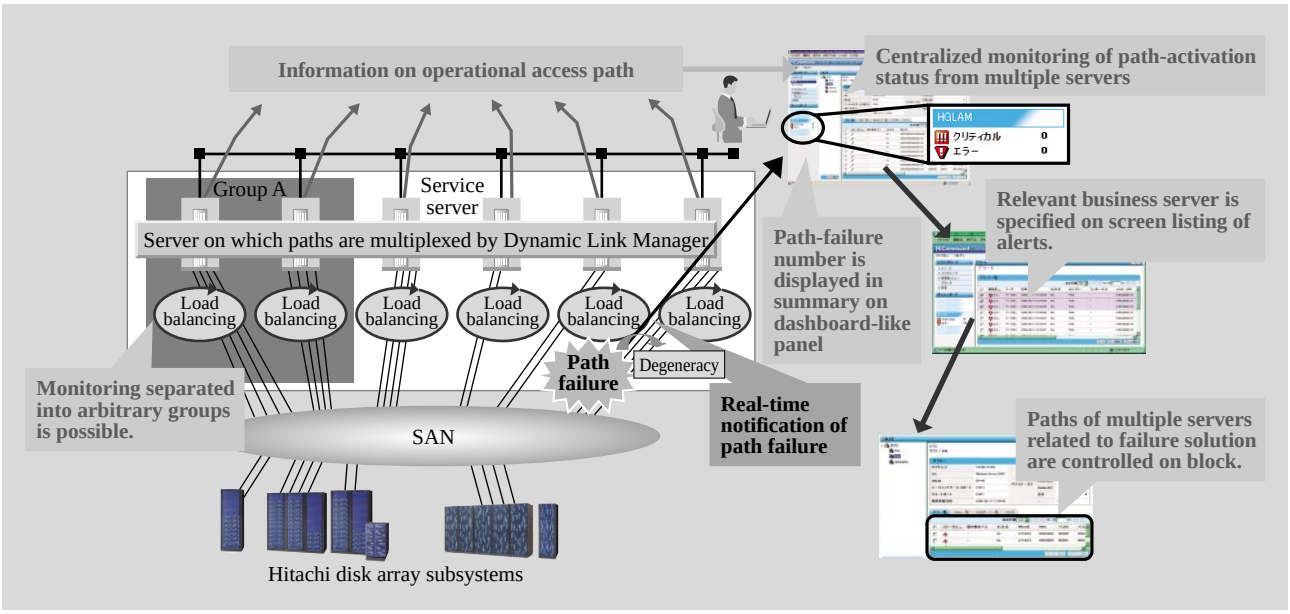

Fig. 4—Overview of Global Link Availability Manager.
Activation status of multiplexed paths can be centrally monitored by Dynamic Link Manager, so eliminating the impact of path failures and handling paths by on-block operation become easy.

Global Link Availability Manager

Multiplexed path-activation status can be centrally monitored by Dynamic Link Manager. Path faults can be displayed in real time, and the activation status of paths can be understood at a glance. Management in terms of hierarchical units of arbitrarily formed groups, as well as in terms of server units and storage units, is possible, and systematic elimination of the extent of impact by path faults and handling by on-block operation become easy (see Fig. 4).

Protection Manager

On-line backup and restore procedures performed during backup operations are simplified by automatically detecting system-configuration information targeting backup control and eliminating complex operations. Various ways of handling Hitachi disk array subsystems, database (Microsoft SQL Server*, Microsoft Exchange Server*), and backup

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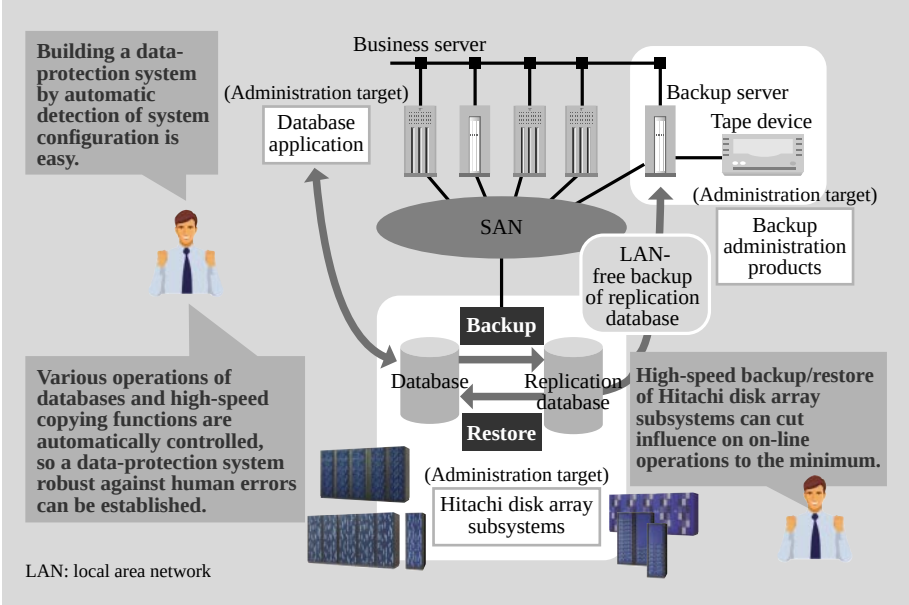

Fig. 5—Overview of Protection Manager.
System-configuration information targeting backup control is automatically detected, and on-line backup and restore operations are simplified.

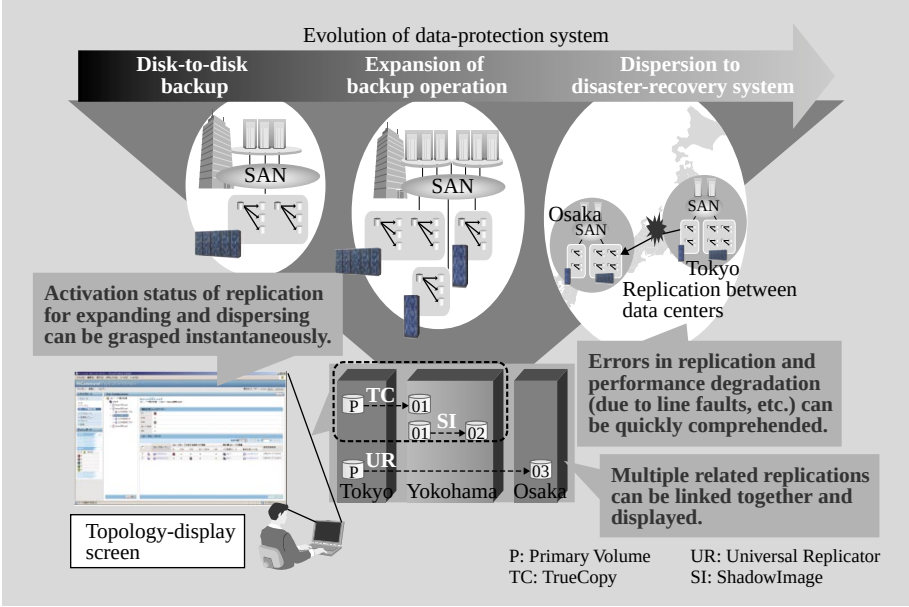

Fig. 6—Overview of Replication Monitor.
Not only can activation status be monitored in an integrated fashion and stable operation of backup and disaster-recovery systems be strengthened but also configuration and activation status of replication can be understood visually.

management products are performed automatically in an integrated manner (see Fig. 5).

Replication Monitor

Complex replication functions are monitored in an integrated fashion, and stable operation of backup and disaster-recovery systems is strengthened. A topology display for visually understanding configuration and activation status of replication is provided (see Fig. 6). Replication status can be monitored hierarchically from the viewpoints of servers, storage, and structural-definition information.

Tuning Manager

To simplify monitoring operations of system performance and capacity during operation of storage system, performance and capacity information regarding storage, switches, servers, and applications are managed in a unified fashion (in regard to acquisition, processing, and display), and functions for activation monitoring (by means of alert notifications of threshold overruns) and long-term-trend forecasting are provided (see Fig. 7). In the case that performance of a server deteriorates, and the primary cause of that degradation is on the storage side, it is possible to analyze the impact on other severs using the same storage.

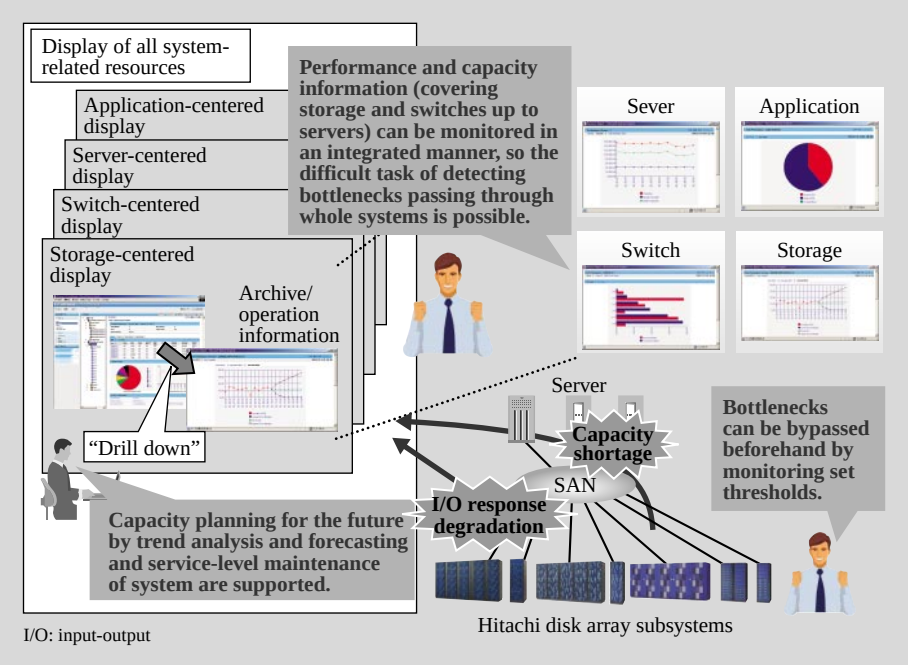

Fig. 7—Overview of Tuning Manager.
Performance and capacity information on storage etc. can be administered in a unified manner, so operations for monitoring system performance and capacity while a storage system is running are simplified.

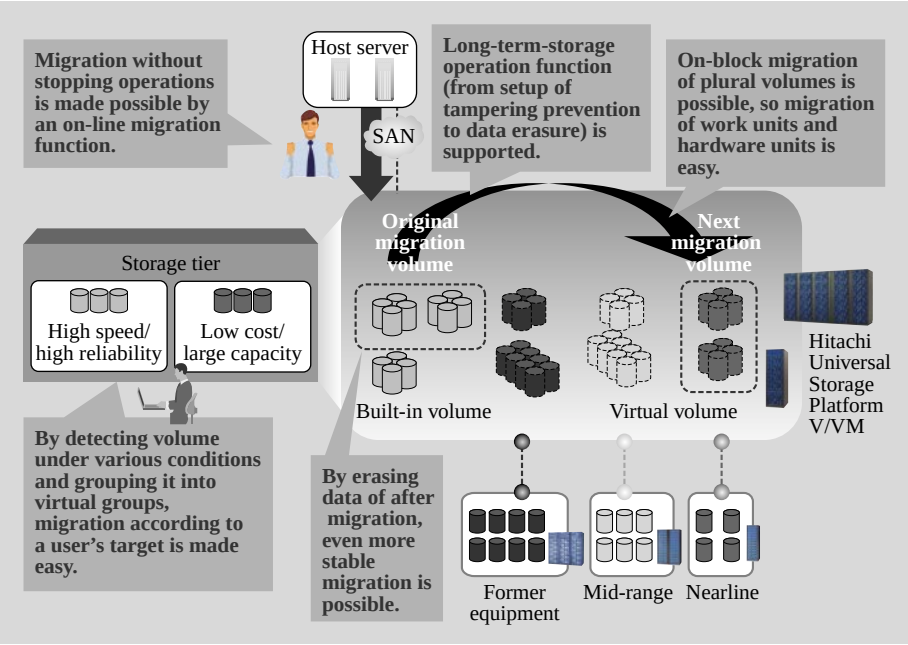

Fig. 8—Overview of Tiered Storage Manager.
By grouping virtualized volumes according to operation requirements, volumes can be migrated to the appropriate tier.

Tiered Storage Manager

By creating "groups" of volume virtualized by Hitachi disk array subsystems by means of a concept known as "tiers" (each of which corresponds to certain operational requirements like performance and cost), volume transition to appropriate tiers is simplified. Long-term storage and practical use of important data (such as falsification prevention, setting up warranty terms, and erasure of unwanted data) are supported (see Fig. 8). In a hierarchical storage environment realized by the powerful virtualization technology of Hitachi's disk array subsystems, data migration can be performed on-line without the need to stop services.

EXAMPLES OF CYCLE FOR OPTIMUM STORAGE-OPERATION MANAGEMENT

The manner in which the capacity virtualization function "Hitachi Dynamic Provisioning" (with the special features of Hitachi's disk array subsystems for enterprise systems and utilizing Hitachi storage-

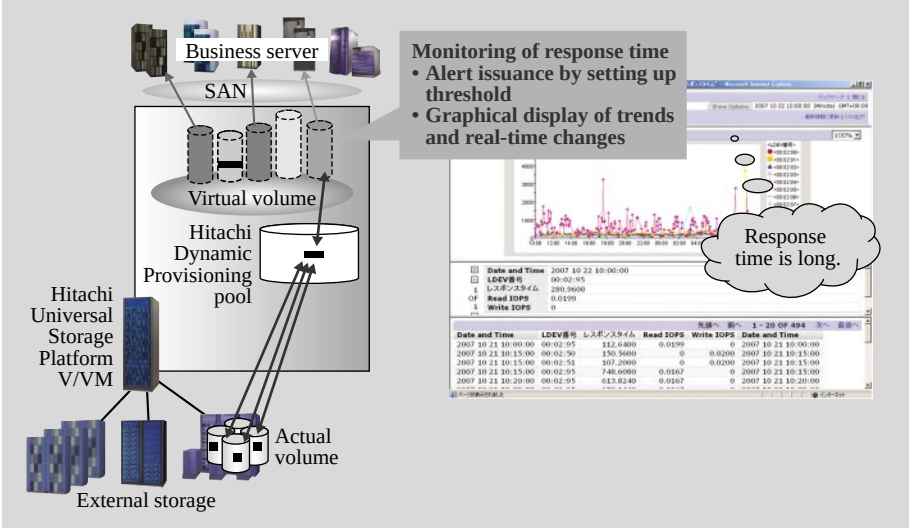

Fig. 9—Example Operation of Tuning Manager. Trends in response time of virtual volume etc. are monitored by Tuning Manager.

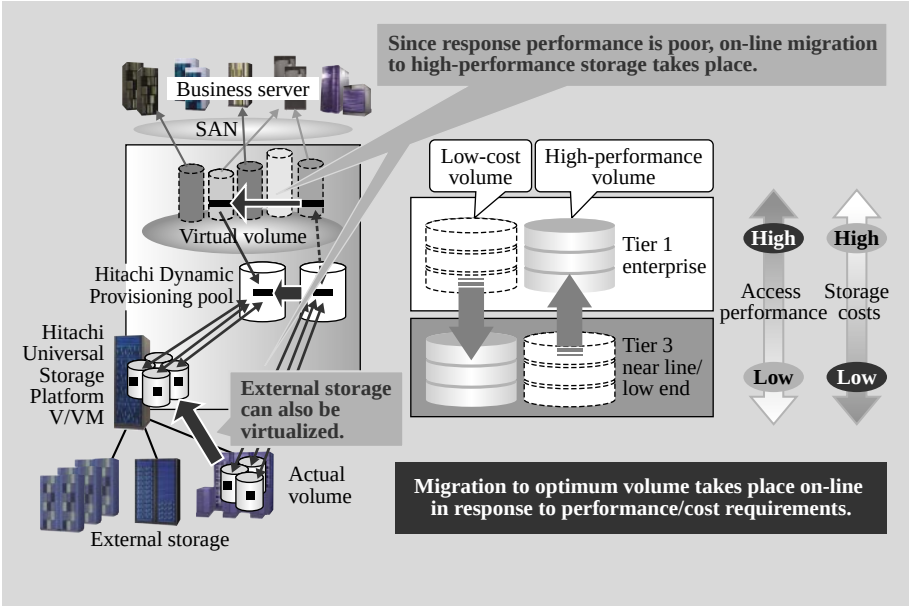

Fig. 10—Example Operation of Tiered Storage Manager. For example, during periods under loading, handling, etc. with high-performance volume is performed, and storage can be effectively utilized.

management software) can be used is explained in the following.

First, the environment for Hitachi Dynamic Provisioning is built by the Device Manager. Backup is acquired by the Protection Manager during periodic operation, and continuity of business is supported. Next, the content of the Hitachi Dynamic Provisioning pool is monitored by the Tuning Manager. Since there is a forecasting function, it is possible, for example, to determine whether capacity will be insufficient in a month's time, and handling of this insufficiency is possible by enlarging the Hitachi Dynamic Provisioning pool beforehand.

Moreover, at the same time, the trend regarding response time of the virtual volume is monitored by the Tuning Manager (see Fig. 9). For example, at the end of a period under loading, on-line migration to high-performance volume is handled beforehand by the Tiered Storage Manager. On the other hand, during a period under no loading, low-cost volume is returned to, and storage is efficiently utilized (see Fig. 10). In this way, by means of not only building but also monitoring and handling, the optimum operation of storage is supported.

EFFORTS TOWARDS IMPROVED USABILITY

Hitachi's storage-management software won the Good Design Award of the Japan Industrial Design Promotion Organization in 2006. It was highly evaluated in terms of not only its visual features but

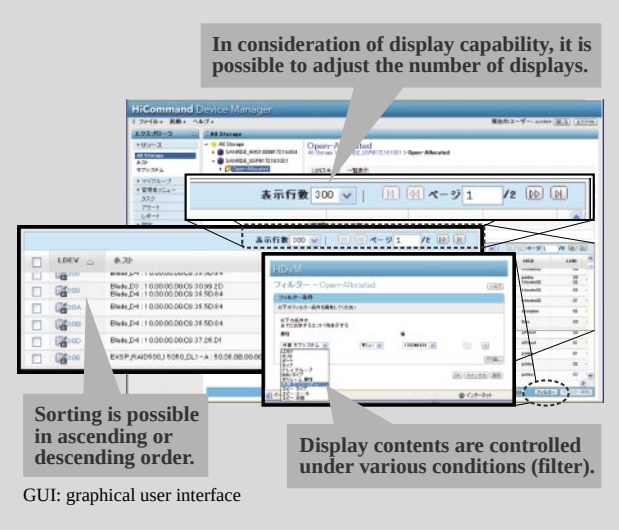

Fig. 11—Example GUI of Hitachi's Storage-management Software.
Having been highly appraised in terms of visual characteristics and ease of operation, Hitachi's storage-management software received the Good Design Award in 2006.

also its ease of handleability. Moreover, not only can many advanced features be used intuitively but also what is the best way to use different products can be considered by looking at a GUI (graphical user interface) (see Fig. 11). For example, with the Tuning Manager, a wide range of performance information can be monitored, and the response times of the server and storage can be displayed together on the main screen. In this way, if there is a problem with either the server or the storage, the GUI is set up in such a manner to make clear "best practice;" that is, which problem should be eliminated first.

CONCLUSIONS

Hitachi's storage-management software for realizing optimum storage operation was described. We consider that in addition to offering products with high added value, Hitachi's storage-management software will continue to provide optimum integrated storage solutions — based on the concept of "Services Oriented Storage Solutions" announced in May 2007 — for hardware and services as well as for customers' operation systems.

REFERENCES

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(2) "Hitachi Storage Solutions," http://www.hitachi.co.jp/storage/ in Japanese.

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