

Open Middleware for Private Clouds

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OVERVIEW: Use of cloud computing for enterprise information systems is becoming increasingly important as a way of resolving issues such as reducing TCO and responding promptly to business changes. Hitachi is taking action on these issues by adopting open middleware that supports Hitachi Cloud Computing Solutions. Through its Job Management Partner 1 IT resource management product and Hitachi Command Suite storage management product, Hitachi is responding to demands to keep TCO to reasonable levels while providing safe and secure IT platforms. Also, Job Management Partner 1 service level management, data integration, and RDB real-time monitor support nimble and flexible enterprise information systems that can keep up with a changing business environment. For the future, Hitachi intends to deliver new value to customers' businesses by enhancing its solutions and products for configuring and operating private clouds.

INTRODUCTION

THERE is an increasing level of activity by companies investigating or adopting cloud computing for their enterprise information systems, with objectives that include keeping the TCO (total cost of ownership) to reasonable levels through the efficient use and administration of IT (information technology) resources, and reacting flexibly and promptly to business changes. In addition to the use of highly reliable IT platforms, key points to consider when moving to the cloud include things like the efficiency of server and other infrastructure operations, and the ease with which business systems can be configured and operated.

Hitachi is taking steps to strengthen the cloud capabilities of its open middleware to ensure that these points are addressed.

This article describes the features of Hitachi's open middleware, which is evolving in step with the growth of cloud computing.

ROLE OF OPEN MIDDLEWARE

The range of open middleware supplied by Hitachi includes Job Management Partner 1, which provides integrated system administration, Hitachi Command Suite for storage management, a SOA (service-oriented architecture) platform, and a RDBMS (relational database management system). These products provide a virtualization environment designed for private clouds and support the configuration and operation of the business systems consolidated in this environment (see Fig. 1).

Job Management Partner 1 includes Job Management Partner 1/IT Resource Management, which is provided for staff who administer IT resources in the form of virtualized servers, networks, and storage. It allocates IT resources appropriately across different business systems and reduces TCO. Business systems have been made more complex by virtualization, and the new Job Management Partner 1/IT Service Level Management software for business system administrators improves responsiveness to business changes by monitoring the service quality of these systems from an end-user perspective in real time.

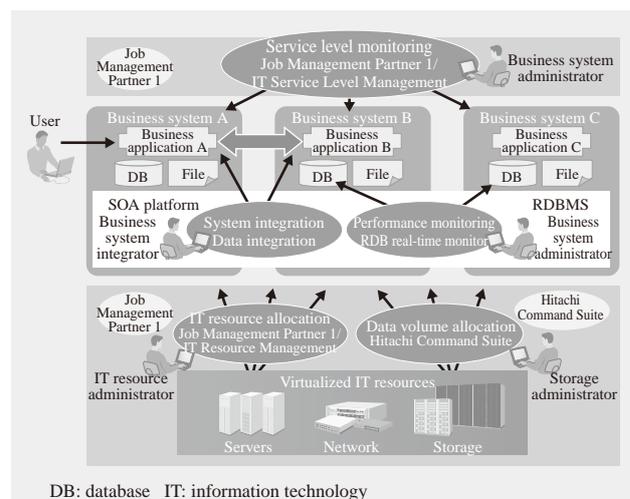


Fig. 1—Hitachi's Open Middleware for Private Clouds. Hitachi's open middleware provides a virtualization environment designed for private clouds and supports the configuration and operation of the business systems consolidated in this environment.

Through its functions for storage administrators, Hitachi Command Suite delivers reductions in TCO and satisfies the requirements for application quality of service by allocating storage resources of varying performance and cost appropriately in response to changing business system requirements. It also provides safe and secure access management for platforms shared by storage administrators from different departments, which are often configured to have multiple levels of security and access for storage administrators.

Through data integration for business system developers, the SOA platform speeds up the development for interlinking existing systems and the cloud, which allows prompt responses to requests for system modifications needed to cope with changes in the business environment.

Through RDB real-time monitor for business system administrators, the RDBMS supports a flexible response to changes in the requirements for application quality of service, because it maintains the database service level when changes occur, such as to the number of users or business data formats.

INTEGRATED SYSTEM MANAGEMENT JOB MANAGEMENT PARTNER 1

IT Resource Management (Job Management Partner 1/IT Resource Management)

To utilize IT resources efficiently throughout the corporation, IT resources that have been purchased separately for each business system are consolidated into a resource pool that can be shared between different systems. Next, resource allocation is optimized by allocating the required quantity of resources from the resource pool, for the period of time required, based on business needs.

The operation lifecycle includes the monitoring and pooling of resources described above, along with resource allocation and usage measurement and optimization. In addition to implementing the entire operation lifecycle, IT resource management also enables the unified management of environments that combine heterogeneous devices, multiple vendors, and multiple virtualization systems (see Fig. 2).

The optimization of resource usage across all corporate IT, including business systems, cannot be left to IT resource administrators on their own, and the cooperation of operational departments is also essential. This is because reviewing resource allocation includes consideration of actual business system usage (such as business systems with low

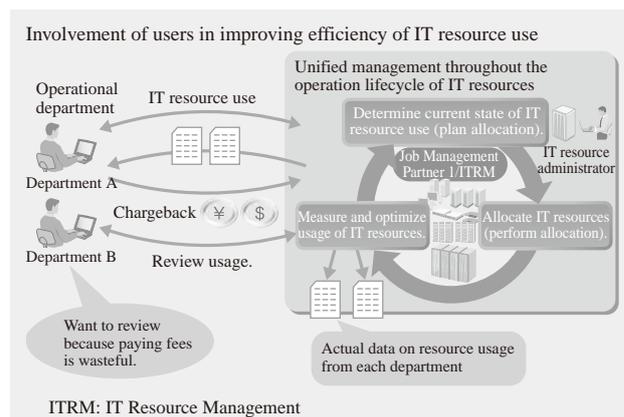


Fig. 2—Job Management Partner 1 IT Resource Management. In addition to providing a complete resource management lifecycle extending from determining the current situation through to allocation and optimization, IT resource management also supports the use of chargeback mechanisms to encourage efficient use by user departments.

utilization because of oversizing), and IT resource administrators are not able to make such judgments on their own.

IT resource management supports use of chargeback mechanisms that bill the departments responsible for business system operation to encourage optimum use of IT resources, including reclaiming resources from systems with low utilization by providing feedback to operational departments on actual resource usage collected on a system-by-system basis.

Timelier optimization requires the provision of self-service portals that allow resources to be used in a way that gives the departments responsible for business system operation direct access to information about resource usage, and these will be made available in the future.

Service Level Management (Job Management Partner 1/IT Service Level Management)

Systems that have been migrated to a private cloud require the same level of availability and performance quality as in their previous form as separately configured systems. Meanwhile, the adoption of virtualization platform software makes the system configuration itself more complex, and it is becoming more and more difficult to determine whether end users are receiving a satisfactory level of service simply by conducting independent monitoring of metrics such as use of server resources and storage I/O (input/output) performance.

In addition to monitoring specific metrics such as server resource usage, service level management also

involves the real-time monitoring of performance metrics, such as the service response performance experienced by the end user, by capturing the actual HTTP (hypertext transfer protocol) messages that the end users are accessing. It supports the maintenance and improvement of the service level of the overall system by defining the standards to be met by these performance metrics, which relate directly to end user experience as SLOs (service level objectives), and undertaking a PDCA (plan, do, check, act) cycle whereby the level to which the SLOs are being achieved can be monitored and evaluated, and the SLOs reviewed.

A feature of service level management is that performance degradation can be detected in advance so that the system administrator can take prompt action before it manifests itself as a failure to achieve SLOs (see Fig. 3).

Service level management also involves using Hitachi's stream data processing technologies to analyze large amounts of continuously generated time series data and autonomously calculate representative performance patterns (baselines) on a day-to-day basis. Then, by comparing current performance data with these baselines, it is possible to detect variations from normal behavior that indicate potential problems. Also, correlating different indicators allows early detection of anomalies to be achieved with greater accuracy than using individual indicators on their

own. An example would be to treat as an anomaly the detection of a deterioration in responsiveness during times of light workload when throughput is low.

HITACHI COMMAND SUITE FOR STORAGE MANAGEMENT

One challenge for storage management when using the cloud is how to reduce costs while simultaneously guaranteeing the requirements for application quality of service. The use of optimum tiered storage helps resolve this issue. Data volumes can be allocated to application hosts from a number of Hitachi Dynamic Tiering pools based on the requirements for application quality of service, where these pools have also been defined based on these requirements, such as prioritizing cost or prioritizing performance. Also, tier (storage) management can be performed based on changes in requirements, such as the ability to transfer an in-use data volume from the low-cost pool to the high-performance pool without shutting down the application (see Fig. 4).

Cases such as when a number of user departments share a platform require multiple levels of security and access for storage administrators, with the associated storage resources allocated in ways that allow the storage administrators for each user department to operate the system safely and easily. Hitachi Command Suite implements access management that allows multiple levels of security and access for storage

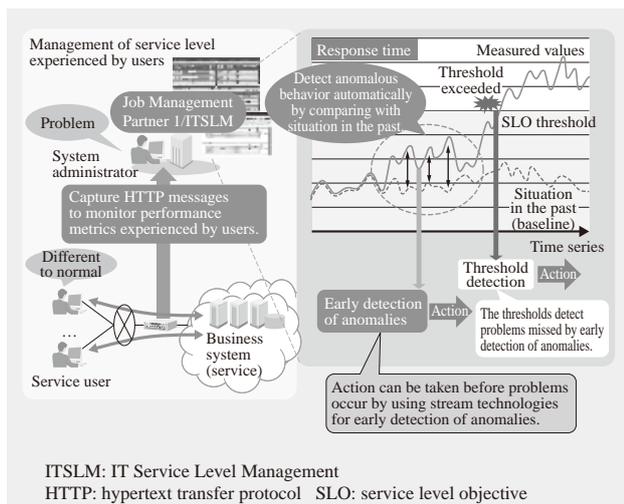


Fig. 3—Job Management Partner 1 Service Level Management. Service level management presents information on the service level provided by each system through real-time monitoring of those service performance metrics that directly impact on the user experience, and uses trends in performance data to analyze the current situation and detect early signs of performance degradation.

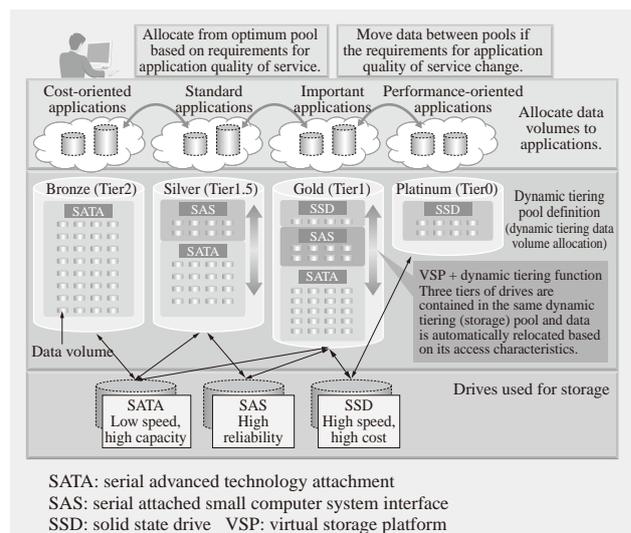


Fig. 4—Management of Tiered Storage to Satisfy Requirements for Application Quality of Service. The system defines a storage pool, which automatically selects the drive on which to store actual data and provides management of tiered storage in which data volumes are allocated from the optimum pool for the application.

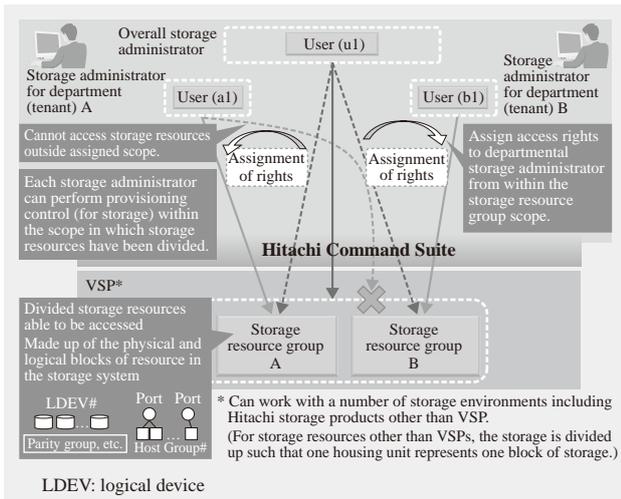


Fig. 5—Overview of Functions for Supporting Multiple Levels of Security and Access for Storage Administrators. Access rights to the managed storage resource groups are assigned to each departmental storage administrator and access control performed for each unit of storage being managed. This means that storage can still be managed independently for each department even if the storage environment has been integrated.

administrators. The overall storage administrator assigns access rights to the allocated storage resources (storage resource groups) being managed to each of the departmental storage administrators so that they can only access their own storage resource groups. This creates a safe environment for administering storage in which each departmental storage administrator can act independently of the others. Also, as each departmental administrator can only see the storage resources that have been allocated to them, operational tasks such as provisioning control (for storage) are simplified (see Fig. 5).

SOA PLATFORM AND RDBMS Data Integration

Progress in cloud technology is driving interest in the use of resizable IT resources for big data processing (such as business systems used to perform monthly batch processing or analytical processing that varies seasonally). Using the large amounts of data accumulated on existing systems in these cloud-based business systems requires data integration with easy exchange of big data.

For data collection and output, data integration uses FTP (File Transfer Protocol), database, and other adaptors able to handle big data. It also performs data conversion in accordance with user definitions, such as for format conversion or character string concatenation. Development times are shortened

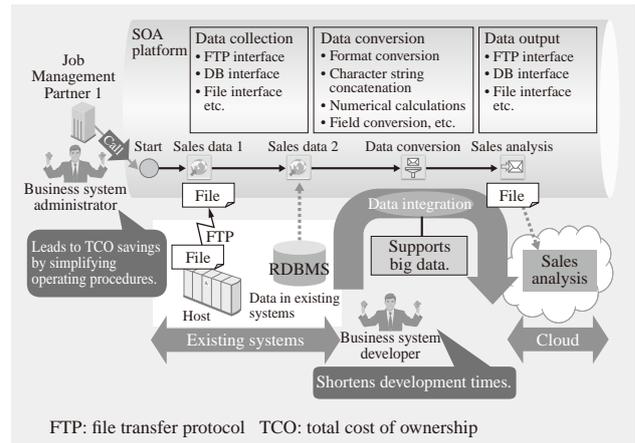


Fig. 6—System Integration Linking Cloud with Big Data in Existing Systems.

Development times can be shortened by using adaptors, conversion definitions, and other tools for making use of the large amounts of data accumulated in existing systems. As operating procedures are also simplified, this also leads to TCO savings through the use of Job Management Partner 1.

because business system developers can achieve data integration without programming, and without having to modify existing systems (see Fig. 6).

Furthermore, through integration with Job Management Partner 1, data integration is invoked automatically in response to a time-based schedule, or events such as reception of a file. For business system administrators, this simplifies operating procedures and reduces TCO.

RDB Real-time Monitor

It is important for private clouds to maintain service levels appropriately by adjusting the IT resources allocated to business systems in response to increases in the number of users and business data fields. This requires prompt action on identifying any bottlenecks in database performance, and investigating their causes in order to achieve stable database performance. In the past, investigating the causes of poor performance was done by examining SQL (structured query language) logs manually to find queries that ran slowly, but the problem with this was the amount of time and effort required.

RDB real-time monitor improves the speed of cause investigation by identifying, in real time, “slow SQL” likely to cause a bottleneck in business system performance, and highlighting these on a dashboard (see Fig. 7). The business system administrator can maintain the service level provided to users by tuning the system to eliminate bottlenecks, such as by expanding the database cache.

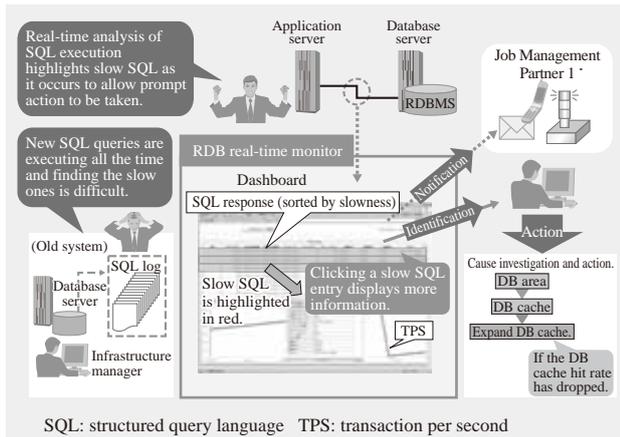


Fig. 7—Real-time SQL Analysis Providing Quick Identification of Slow SQL.

Identifying slow SQL at an early stage and taking prompt action both improves workplace efficiency and maintains the customer service level.

By linking to Job Management Partner 1, it is also possible to instigate cause investigation at an earlier stage by having notifications sent by e-mail or mobile phone when responses deteriorate.

CONCLUSIONS

This article has described the features of Hitachi's open middleware, which is evolving in step with the growth of cloud computing.

For the future, Hitachi intends to continue supplying new value to customers' businesses by enhancing its cloud solutions and products.

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