SUCCESS STORY

> " We selected Hitachi UCP [Unified Compute Platform] for VMware vSphere to go on expanding our business: It simplifies physical device management and maintenance with Hitachi Device Manager. It breaks through limitations of classical hierarchical Ethernet architectures with Brocade VDX Ethernet Switches. And, it ensures current and future storage performance with Hitachi Accelerated Flash on Hitachi Virtual Storage Platform. "
>
> *Yongzhi ZHAO*
> *Chief Operating Officer*
> *CapitalOnline*

CapitalOnline Builds Intelligent "Cloud Service" Data Center With Hitachi Unified Compute Platform for VMware vSphere

CapitalOnline is one of the earliest Internet data center (IDC) service providers in China. The company has been growing into a leading integrated cloud service provider in China since it entered the market in 2009. CapitalOnline is committed to focusing on cloud with additional IT outsourcing on the basis of traditional data center services. It provides various services, including cloud server, IDC hosting and IT value-added services, IT outsourcing and communication integration. To support these activities, CapitalOnline turned to Hitachi Unified Compute Platform for VMware vSphere from Hitachi Data Systems.

The Challenge

CapitalOnline offers products for industries such as finance, insurance, government, healthcare and Internet. Working with its partners, CapitalOnline grows with customers and helps many of them take leadership in their industry. With growth of information technology, companies are increasingly relying on the Internet. CapitalOnline aims to provide more professional and reliable services to customers. Given the rising end user requirements, number of users and hardware platform, however, many issues are emerging, including:

- **Dispersed infrastructure.** CapitalOnline purchased its hardware as its business grew over the past several years, and the brands and models of hardware vary. As a result, CapitalOnline has to maintain and manage increasingly disparate types of hardware devices, tasks that have become more complicated without unified management and scheduling.

- **Limitations of existing Ethernet.** Legacy Ethernet networks do not allow loops, which can prevent normal data transmission. Spanning Tree Protocol (STP) is required to cut loops. Traffic destined for devices in adjacent racks must travel up and back down the 3-tier design topology. In contrast, most of

CapitalOnline Data Service Co., Ltd.

INDUSTRY
Services: Information Technology

SOLUTIONS
Enterprise Platform, Compute

HARDWARE
Hitachi Unified Compute Platform for VMware vSphere (comprising Hitachi Virtual Storage Platform and Hitachi Compute Blade 2000 with Brocade Ethernet and Fibre Channel embedded switches)

SOFTWARE
Hitachi Device Manager, Hitachi Dynamic Tiering, Hitachi Accelerated Flash, Hitachi flash acceleration feature

SERVICES
Planning and implementation services provided by Hitachi Data Systems Global Services

Benefits at a Glance
- Unified management.
- Top performance, up to 300,000 IOPS.
- 5x faster Storage vMotion.
- Improved network performance.
- Increased return on investment.

Hitachi Data Systems

the traffic in data centers today is between servers in several racks of existing server clusters, and legacy Ethernet designs increase data delay. Path convergence lasts dozens of seconds, even though STP can automatically recover when a link is lost. This time frame is unacceptable to the CapitalOnline high-availability data center. Lastly, both complexity and the opportunity for configuration errors are rising with the increase of switches because every switch and each of its port must be configured independently.

■ **Increasing storage performance requirements.** Since its 1st generation of cloud hosting offerings, CapitalOnline has been trying to attack the intrinsic bottleneck using new technologies to meet its customers' requirements. With Hitachi Virtual Storage Platform, which configured more than 800 serial attached SCSI (SAS) and nearline (NL)-SAS disks, its old generation of cloud server provides up to 120,000 IOPS. To meet extreme customer requirements, CapitalOnline raised a higher demand for storage, 200,000 IOPS, in this project.

The Solution

HDS took a consultative approach with CapitalOnline, and worked with their IT team to understand their requirements, their current IT issues and their expectations for growth. As a result, HDS recommended a unified solution: Hitachi Unified Compute Platform (UCP) for VMware vSphere. This solution includes best-in-class Hitachi Compute Blade (CB) 2000 servers, Brocade 5460 Fibre Channel and Brocade VDX 6746 Ethernet fabric switches, and Hitachi Virtual Storage Platform, which incorporates Hitachi Accelerated Flash (HAF) storage. To guarantee a successful go-live of the overall solution, HDS and CapitalOnline performed several proofs of concept and tests in the initial stage of the project. This Hitachi solution simplifies management, improves overall platform performance, and meets requirements for stability and future hardware expansion. The configuration includes:

Hardware for Hitachi UCP for VMware vSphere

1. Sixteen CB 2000 blade servers, each with 2 Brocade VDX 6746 Ethernet fabric switches, 8 X55-R3 full-height blades and
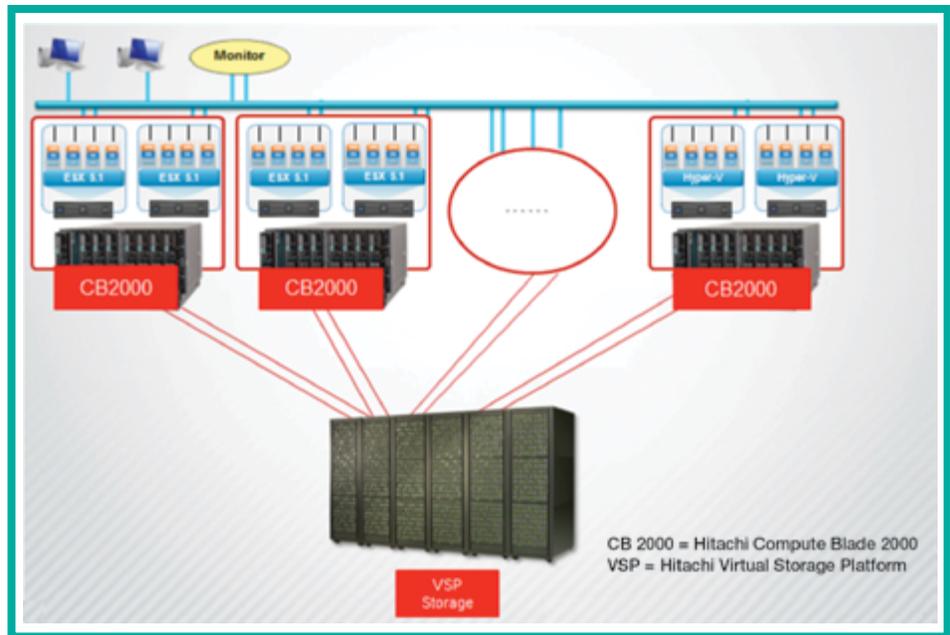
UCP for VMware vSphere

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Figure 1. CapitalOnline Cloud Platform Solution From Hitachi Data Systems

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2 Brocade 5460 Fibre Channel switches. Both the Ethernet and Fibre Channel switches are redundant to guarantee high availability of the switches. For the blades, virtual machines are deployed to further segment computing resources and ensure their high availability. HDS and Brocade jointly developed the high-end CB 2000. It offers unique blade features such as blade convergence, logic partitioning (LPAR) and mixed I/O. It also simplifies the network in the data center with leading networking technologies of Brocade, providing unprecedented improvements in network simplicity, efficiency and flexibility.

2. A single VSP high-end disk array: The array is composed of nine 1.6TB HAF modules as well as high-performance SAS disks and large-volume NL-SAS disks with up to 1PB of overall raw capacity. The HAF modules meet the 200,000 IOPS requirement and the combine SAS and NL-SAS hard disks address their space requirement.

Software

1. Hitachi Device Manager (HDvM): In addition to monitoring and managing the existing and new VSP disk arrays of CapitalOnline, HDvM can also manage the CB 2000 blades. It allows for unified management of dispersed devices on a single interface by incorporating management of Brocade VDX 6746 Ethernet fabric switches and 5460 Fibre Channel switches into the blade management.

2. Hitachi Dynamic Tiering (HDT): HDT was selected to maximize the utilization of VSP. The software can automatically allocate data to HAF, SAS and NL-SAS disks, based on activity, ensuring full use of all disks.

3. Hitachi flash acceleration feature: This feature further optimizes the underlying code. Given the same workload, the flash acceleration feature can help VSP component usage, to ensure the ultimate performance of storage.

The Benefits

- **Unified management.** Hitachi Unified Compute Platform for VMware vSphere offers unprecedented management experience. Both the front-end Brocade VDX 6746 Ethernet switch and the back-end, high-end Hitachi Virtual Storage Platform are monitored and managed in a unified manner through Hitachi Device Manager. Furthermore, the previous VSP is also incorporated into the unified management. Depending on user requirements, the solution can also be upgraded to connect hardware management to the virtual machine (VM) interface. Then the VM interface can manage both virtual and physical devices, further boosting monitoring and management integration.

- **Ethernet fabric.** Based on Brocade VCS Fabric technology, Brocade VDX 6746 is an Ethernet switch that is designed for highly virtualized environment. It eliminates many limitations of traditional Ethernet switches. Compared with classic hierarchical Ethernet architectures, Brocade VDX 6746 can provide higher levels of performance, utilization, availability and simplicity with the VCS Ethernet fabric. It:

  - **Eliminates the need for STP**: At the same time it remains interoperable with existing Ethernet networks.

  - **Provides flexibility:** It can be architected in any topology to best meet the needs of any variety of workloads.

  - **Supports resiliency:** Multiple "least cost" paths are used for high performance and high reliability.

  - **Is elastic:** It easily scales up and down at need.

  - **Enables ease of management:** Several VDX Ethernet switches can share information and be managed as a single logical switch, significantly simplifying management and reducing operating expense.

  - **Allows VM mobility:** Provides unrivalled monitoring and automation.

- **Improved performance.** With UCP for VMware vSphere, VMware vSphere Storage vMotion is at least 5 times faster than before. With original products, vMotion required around 10 minutes. With the UCP solution provided by HDS, the time has been shortened to 1-2 minutes. HAF, a flash storage

module that HDS designs for enterprise applications, is based on the flash controller with high-performance architecture. The module consists of 4-core processors, 32 flash buses and 128 flash chips. In addition, it supports online data compression, fault tolerance, data cleaning and data refresh, to guarantee its ultra-high performance and stability as well as its life of service. The Hitachi flash acceleration feature and Hitachi Dynamic Tiering further improve the utilization and overall performance of the module. It is estimated the current VSP can provide up to 300,000 IOPS, which is much greater than what is required now. Moreover, its performance can also be upgraded in the future depending on the company's requirements, providing up to 600,000 IOPS.

A Look Ahead

With the leading cloud hardware and the comprehensive solution from Hitachi Data Systems and Brocade, CapitalOnline successfully deploys its latest generation of cloud server infrastructure. Compared with its previous generation, the new solution for CapitalOnline now provides a more stable and powerful cloud server to its customers. The solution further widens the technology gap with CapitalOnline's competitors and enhances its leadership in cloud computing industry. Additionally, the company can better simplify its equipment management and maintenance, reduce workforce costs, and increase its overall return on investment.
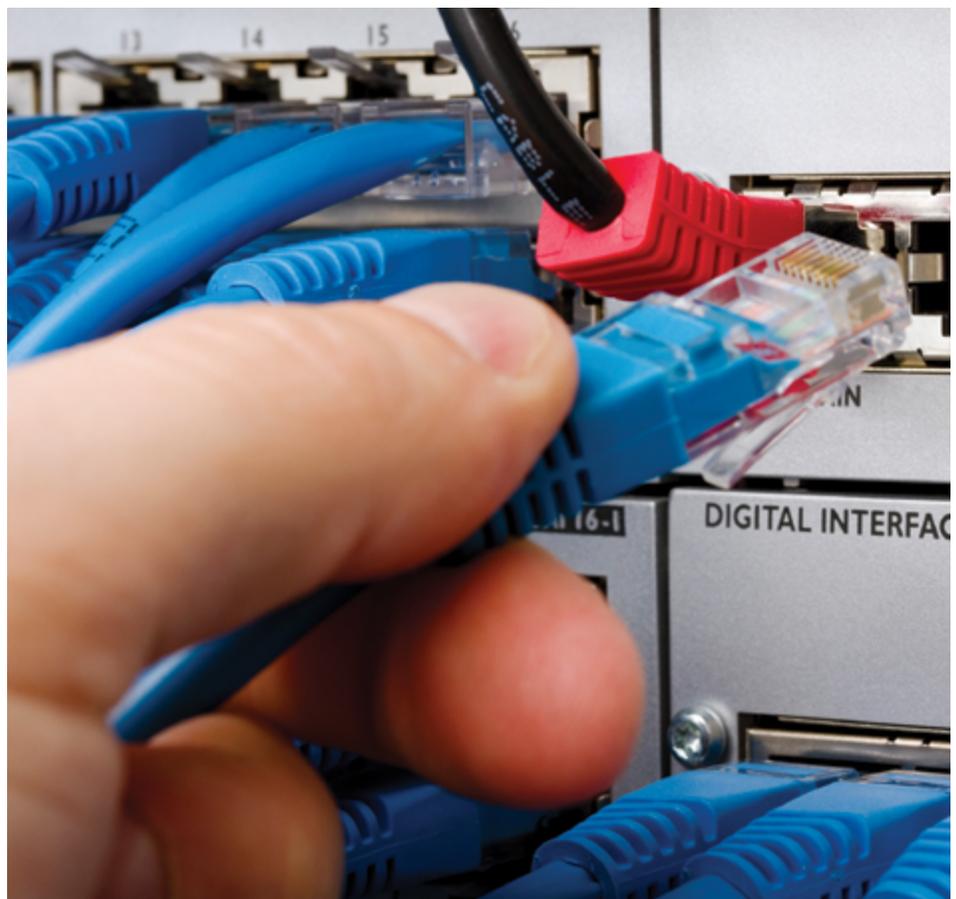
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