



Success Story

CTC adopted clustered Data ONTAP for Microsoft VDI supporting its new client environment, achieving both fast access and operational excellence with storage connection through SMB 3.0



KEY HIGHLIGHTS

Industry

- Information and Communications Technology

The Challenges

- Delivering a client environment that can bring business continuity and a change in working environment
- Providing a client environment that can meet various user needs
- Building a virtual desktop environment that can be accessed from a wide range of terminals

The Solution

- NetApp clustered Data ONTAP® 8.2-RAID-DP, FlexVol, Deduplication
- NetApp FAS system in active-active configuration
- NetApp Flash Cache
- NetApp OnCommand™ management software

Benefits

- Increased operational excellence of storage system by adopting SMB 3.0
- Optimized data storage cost through deduplication
- The system is now ready to be introduced as an advanced customer showcase

- Virtual desktop infrastructure has been added as a new client environment on information infrastructure "eWork+@CTC" promoted by ITOCHU Techno-Solutions.
- Microsoft® Windows® Server 2012 R2-based Microsoft VDI has been adopted as a virtual desktop solution.
- NetApp storage with clustered Data ONTAP, which has achieved high availability, has been selected for a storage system to support a virtual desktop infrastructure.
- SMB 3.0 has been adopted for a connection between Hyper-V and NetApp storage to easily handle virtual OS images in file-based storage.
- High data deduplication rates of 70 - 80% have been achieved with the data deduplication feature of NetApp storage, resulting in storage cost optimization.
- CTC is planning to automate a virtual desktop infrastructure operation in the future, and it is also hoping to leverage the API offered by NetApp as a means for higher connections with storage.

CTC has been engaged in changing the working environment within the company over the past few years

ITOCHE Techno-Solutions Corporation (hereinafter referred to as "CTC") is a solution provider that is competent in providing comprehensive support to the IT lifecycle, including ICT, finance and distribution industries, front-line mission critical systems development, open systems infrastructure construction, and data center operations. As a leading company

proficient with cutting edge technologies, such as cloud and big data, CTC provides comprehensive services from consulting to design, building, operation and maintenance support. CTC has also actively engaged in changing the working environment of its employees in order to increase work efficiency and productivity and to improve service quality to its customers. When the offices in the Tokyo area were merged in 2004, CTC promoted "eWork@CTC," a project for building and operating the information system infrastructure.

"A virtual desktop infrastructure we built has effectively combined the latest solutions from NetApp and Microsoft."

(Left)

Mr. Hironori Asanuma
Information Systems Department
ITOCHU Techno-Solutions Corporation

(Center)

Mr. Katsuaki Higuchi
Manager
Information Systems Department
ITOCHU Techno-Solutions Corporation

(Right)

Mr. Takaya Nagata
Deputy General Manager
Information Systems Department
ITOCHU Techno-Solutions Corporation



The eWork@CTC project comprises various elements, and thin client in particular has a direct impact on employees' routine tasks. CTC built a system as its first thin client architecture based on terminal services of Microsoft® Windows® Server 2003 R2, and has achieved security reinforcement and usability improvement in a well-balanced manner. Later, it introduced Microsoft® Windows® Server 2008 R2-based remote desktop service (RDS) in 2011, and completely migrated the previous thin client architecture to the RDS-based thin client architecture in March 2013. Today, nearly 6,000 RDS-based thin clients are deployed, which will be increased to 8,000 in the future. In the meantime, a significant number of conventional client PCs has also been used as terminals for tasks not suitable for thin clients.

[A virtual desktop environment deployed as a new terminal environment to support eWork+@CTC](#)

After spending many years on the eWork@CTC operation, CTC is now preparing "eWork+@CTC," a next-generation information infrastructure. The eWork+@CTC project is an advanced version of eWork@CTC redesigned to meet advanced IT technologies and business environment changes. It is aimed at not only managing both security in a work environment and usability at a high level, but also enhancing communication and collaboration within the company. Furthermore, since experiencing the Great East Japan

Earthquake in March 2011, CTC has been reinforcing its systems for business continuity across the company. Initially, CTC placed high expectations on thin client as it can be used anywhere for its business tasks. However, there were cases where thin client was not capable enough for some tasks, and it had to use conventional desktop PCs in the office as well.

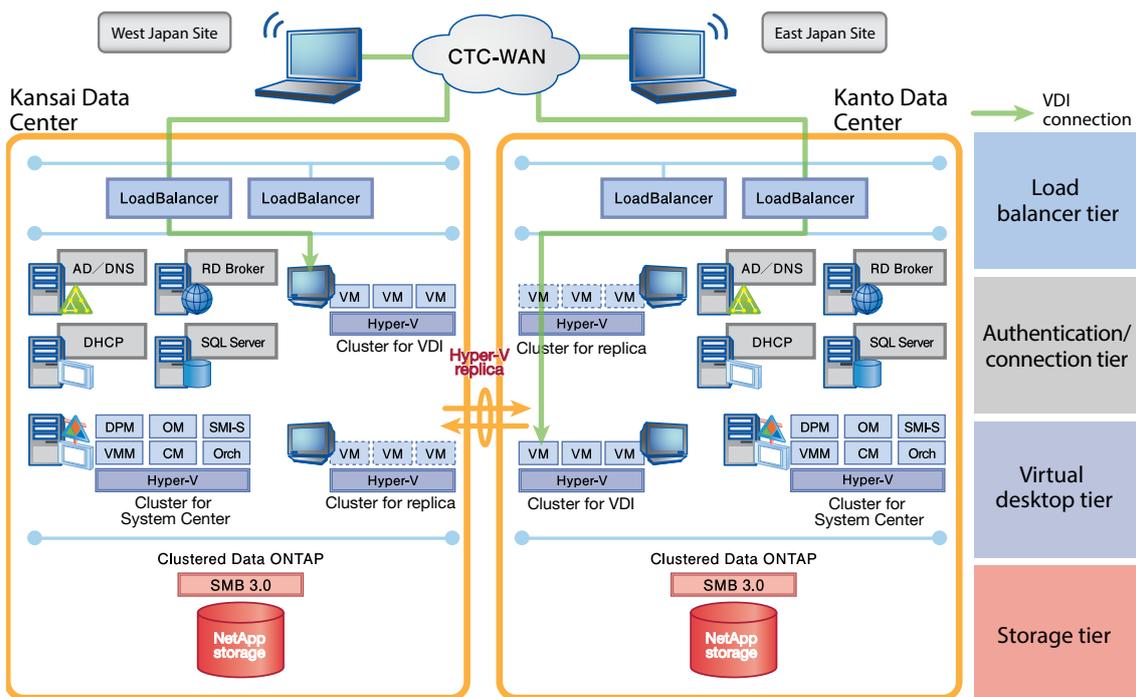
"Though we thought we could solve most business continuity challenges at user levels with thin client, we discovered unexpected issues during actual operations. With the RDS-based thin client, a user environment including the installed application is preconfigured. This means that it is suitable for users who deal with routine tasks but it doesn't allow the installation of different applications for each user. For example, our finance department, that supports cash flow management, plays an integral role in continuing our business. However, because finance tasks require the installation of special finance/accounting software or macros, they had to use desktop PCs in the office instead. This prevented us from meeting our goals for business continuity and thus we were looking for new solutions to replace conventional PCs and thin client," says Mr. Nagata.

CTC focused on a virtual desktop solution that can provide unique desktop environment to each user. With a virtual desktop solution, all desktop environments are managed at data-

center side so high-standard security that is comparable to thin client can be provided, along with an environment where users can work as if they were in the office regardless of their physical location. It also has huge advantages in that there are fewer restrictions in software utilization - unlike thin client - and it is flexible enough to install any applications according to user needs. In short, a virtual desktop environment is a solution that can provide thin client level of advanced security and business continuity, as well as a flexible software environment comparable to PCs.

[System configuration combined with Microsoft VDI and clustered Data ONTAP](#)

In order to select the appropriate virtual desktop solution, CTC particularly focused on varieties of terminals to access a virtual desktop environment. In recent years, terminals for end users have ranged from Microsoft® Windows® -based PCs and tablets to PCs with Mac OS, tablets and smartphones with Android or iOS, etc. In this scenario, RDP (Remote Desktop Protocol), a connection protocol for a virtual desktop environment developed by Microsoft, supports a wide range of terminals. For this reason, CTC has decided to introduce Microsoft VDI (Virtual Desktop Infrastructure) running on Microsoft® Windows® Server 2012 R2 as its virtual desktop solution that can be used with various kinds of terminals.



CTC also selected NetApp storage with clustered Data ONTAP for its storage system to support a virtual desktop infrastructure. CTC has not only sold a number of NetApp storage solutions to its customers but has also deployed them widely in its own business systems. For example, NetApp FAS systems have been used for storing virtual OS images and roaming user profiles in the RDS-based thin client infrastructure operating since 2011. This proven experience in thin client infrastructure operation encouraged CTC to deploy NetApp storages for a virtual desktop infrastructure. Clustered Data ONTAP was selected for a virtual desktop infrastructure because CTC focused on its storage availability, ease of data migration, and compatibility with Windows Server 2012.

"Previously, we purchased a dedicated storage system every time we built a business system," says Mr. Asanuma. "Even when we take a look at NetApp products only, different models and OS versions are mixed and each is operated as a siloed system. With clustered Data ONTAP, however, we can assign various NetApp products to one storage cluster, allowing us to use the NetApp products in different clusters according to their specific purpose for future needs, or to migrate previous models to the most recent ones without interrupting services. We also focused on its storage availability, which can be significantly increased. Usually,

two storage controllers are configured in an HA pair for redundancy, so it is ideal to update the pair simultaneously with a major OS upgrade. With 7-Mode, we have to interrupt services, but clustered Data ONTAP allows us to upgrade both in an HA pair simultaneously without interrupting services by temporarily moving volumes to a different node in a cluster."

Adopted file-based SMB 3.0 as a connection protocol for virtual OS image space

CTC completed the building of a virtual desktop infrastructure in September 2013 and a trial operation with around 400 users across the company has been running since February 2014. NetApp FAS3220AE in a two-node configuration was introduced to a storage system that supports a virtual desktop infrastructure, and is installed in data centers in both Kanto and Kansai areas. The virtual machines (virtual desktop infrastructure) are replicated between these two data centers using the Hyper-V replication feature of Windows Server 2012, ensuring continuous virtual desktop service, which is crucial for business continuity, even if either data center is affected by a major disaster.

Storage controllers configuring the cluster are equipped with cache modules based on a flash technology (Flash Cache) for use in a virtual desktop infrastructure. This will prevent

the storage system from creating a bottleneck even when a number of software updates, virus scans, or user logins occur simultaneously. Virtual OS images for each user are created by cloning predefined templates, and the disk usage is minimized by applying NetApp deduplication to virtual OS image spaces. So far a 70 - 80% data deduplication rate has been achieved, and it is expected to increase as the number of users increases. The highlight this time is that CTC deployed SMB 3.0 for a connection between Hyper-V and NetApp storage to leverage the unique advantages of Windows Server 2012 R2 and clustered Data ONTAP.

"In the RDS-based thin client infrastructure, we incorporated iSCSI for virtual OS image spaces and CIFS for roaming user profile spaces as a connection protocol between a server and a storage system. We therefore considered using iSCSI for connecting virtual OS image spaces in Microsoft VDI as well, but decided to deploy SMB 3.0 in the end since we want to have easy file-based access to virtual OS images on a storage system. Since SMB 3.0 has completely solved the issue of a session being disconnected when a storage controller failover occurs, we could deploy it with confidence to systems such as virtual desktop infrastructure where availability is particularly important," says Mr. Higuchi.

"We want to actively leverage NetApp API integrations for operational automation of virtual desktop infrastructure."



Aiming for operational automation including storage systems through API integration

CTC leverages Microsoft® System Center 2012 R2 optimized for Windows Server (Hyper-V) environments for managing a virtual desktop infrastructure. In this configuration, SMI-S provider from NetApp is deployed to operate NetApp storage from Microsoft® System Center 2012 R2 Virtual Machine Manager (SCVMM). Currently, CTC is using its original scripts to enhance operational efficiency but it is aiming for operational automation with Microsoft® System Center Orchestrator 2012 in the future. For this goal, it is critical to have a connection between a storage system and network as well as servers running Windows Server. CTC has high expectations on leveraging APIs clustered Data ONTAP offers for an advanced connection with NetApp storage.

Currently, a virtual desktop infrastructure is only being used by some users on a trial basis. However, CTC is planning to conduct

a user survey to improve system configurations and operation styles based on feedback. It is planning to launch with an expanded number of users from the current 400 users at an official release in October 2014. With this virtual desktop infrastructure, Windows 7 or Windows 8.1 can be selected as a terminal OS system to offer users the ideal terminal environment for their needs. However, as CTC is a technology-oriented company, there could be cases where terminals other than Windows are required for its tasks. Therefore, it is considering offering more options such as Linux and FreeBSD.

"CTC has been taking an approach to provide better solutions with best-of-breed based on multi-vendor configuration," says Mr. Nagata. "Our internal systems are also configured with multi-vendors rather than with a single vendor. This time we effectively incorporated the latest solutions from two vendors, clustered Data ONTAP and Windows Server 2012 R2, to configure a virtual desktop infrastructure to support eWork+@CTC. As a result, we believe

that we can build a significantly advanced system. As a company that provides cutting edge IT solutions, we will leverage our virtual desktop infrastructure built this time as a showcase to our customers."

COMPANY PROFILE

ITOCHU Techno-Solutions Corporation
<http://www.ctc-g.co.jp/>

Head Office 3-2-5, Kasumigaseki,
Chiyoda-ku, Tokyo
Japan

Established April 1972

Paid-in Capital 21,763 million yen

Number of employees 3,919 (CTC Group Total :
7,960 ; as of April 1, 2014)

Business overview Sales, maintenance and support of computers and network systems; commissioned software development; information processing services; information services related to science and engineering; support; other



www.netapp.com

NetApp, Inc.

495 East Java Drive, Sunnyvale, CA 94089 United States
TEL: +1 408 822 6000

URL: <http://www.netapp.com> E-mail: info@netapp.co.jp

NetApp provides effective storage and data management solutions that enable dramatic cost reduction and enhance your company's competitiveness.

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