White paper

FUJITSU

The Fujitsu Storage ETERNUS AF series and ETERNUS DX series plug-in for Veeam Backup & Replication eases high-speed backups of virtual environments

The combination of Veeam® Backup & Replication™ and Fujitsu plug-in for Veeam Backup & Replication (VBR) is optimal for backups of virtual environments.

Content

Preface

As production servers are being consolidated with virtual environments at a rapid rate, data protection via backups is as important as ever. Problems such as lengthy backups due to server consolidation and reduced performance of virtual environments are not easy to solve. Fujitsu plug-in for Veeam® Backup & Replication™ (VBR) has been released to take advantage of VBR's outstanding backup capabilities.

This document explains the advantages of adopting the Fujitsu plug-in for VBR and provides a verification of its effectiveness to create backups of virtual environments.

• **Target audience**
  This document targets the following audience:
  • Those considering the adoption of Veeam Backup & Replication
  • Those who want to confirm the effectiveness of Veeam storage integration
  • Those who want to resolve problems with backups of virtual environments

• **Applicable series**
  This document covers the following series:
  • Fujitsu Storage ETERNUS AF150 S3, AF250 S3/S2 and AF650 S3/S2
  • Fujitsu Storage ETERNUS DX60 S5/S4, DX100 S5/S4, DX200 S5/S4, DX500 S5/S4 and DX600 S5/S4

• **Naming conventions**
  The following abbreviations are used in this document.
  • Fujitsu Storage ETERNUS AF S3/S2 series all-flash arrays → **ETERNUS AF series**
  • Fujitsu Storage ETERNUS DX S5/S4 series hybrid storage systems → **ETERNUS DX series**
  • Fujitsu Storage ETERNUS AF S2 series and ETERNUS DX S4 series (excluding ETERNUS DX8900 S4) → **ETERNUS AF S2/DX S4**
  • ETERNUS AF series and ETERNUS DX series (excluding ETERNUS DX900 S5 and ETERNUS DX8900 S4) → **ETERNUS AF/DX**
  • Fujitsu plug-in for Veeam Backup & Replication → **Fujitsu plug-in for VBR**

ETERNUS AF/DX

The ETERNUS AF series is a high performance, high reliability storage system developed by Fujitsu. This series uses SSD data storage, eliminating the processing of conventional HDD data storage to increase speed, reduce power consumption and save space.

Furthermore, by implementing Fujitsu's one-of-a-kind technology, the lifespan and performance of high-speed SSDs have been maximized. By using high performance CPU and multiprocessing technology, the performance of the storage system has been greatly improved, which firmly accelerates databases, virtual environment consolidations and data analysis.

The ETERNUS DX series utilizes a hybrid storage configuration, which combines ultra-high-speed SSDs, high-speed online SAS disks and large-volume, low-cost Nearline SAS disks. These can be used flexibly to optimize the resources of the system based on the customers' needs.

Veeam Backup & Replication

Designed primarily for VMware vSphere and Microsoft Hyper-V[*1] virtual environments, Veeam Backup & Replication integrates virtual machine backups and replications in a single solution and offers a large array of optional features that support leading applications without the need to install agents. For virtual machine backups, in addition to a full backup, a forward incremental backup, forever forward incremental backup or reverse incremental backup can be selected based on the environment. This software also has a high affinity with storage systems and includes a function to create backups by integrating the storage system's snapshot function. With the Instant VM Recovery function to recover virtual machines for VMware environments, backup files can be accessed directly and used to quickly restore virtual machines to the production environment. Instant VM Recovery can reduce the targeted time for recovery, also known as a recovery time objective (RTO)[*2], and minimize the amount of time that the production environment VMs are suspended or down.

*1 Virtual environment supported by Fujitsu.
*2 The targeted amount of time until the system can be recovered from an abnormality.

Fujitsu plug-in for VBR

The ETERNUS AF/DX supports Veeam storage integration. Installation of Fujitsu plug-in for VBR on the Veeam backup server enables Veeam storage integration to create backups of virtual machines efficiently at high speed.
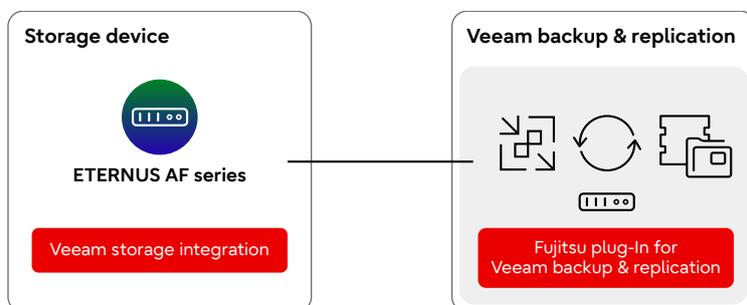
Virtual machine backups with Fujitsu plug-in for VBR

Fujitsu plug-in for VBR is a plug-in that integrates Veeam Backup & Replication via Universal storage API and uses storage snapshots to create backups of individual virtual machines. By taking the lifetime of the VM snapshot created by VMware Storage API[1] into consideration, conventional backup operations are performed when the load on the production server is low. By leveraging storage snapshots, the VM snapshot lifetime is reduced. This minimizes the impact on the performance of the production server. As a result, designing backup operations can be simplified. As storage snapshots offload the CPU and I/O loads of the ESXi host that is performing the backup to the storage system, the time required for the backup is reduced without affecting the performance of the virtual machine targeted for the backup. Therefore, multiple backups can be performed efficiently during the same period.

The following figure shows the process of a data backup using a storage snapshot.
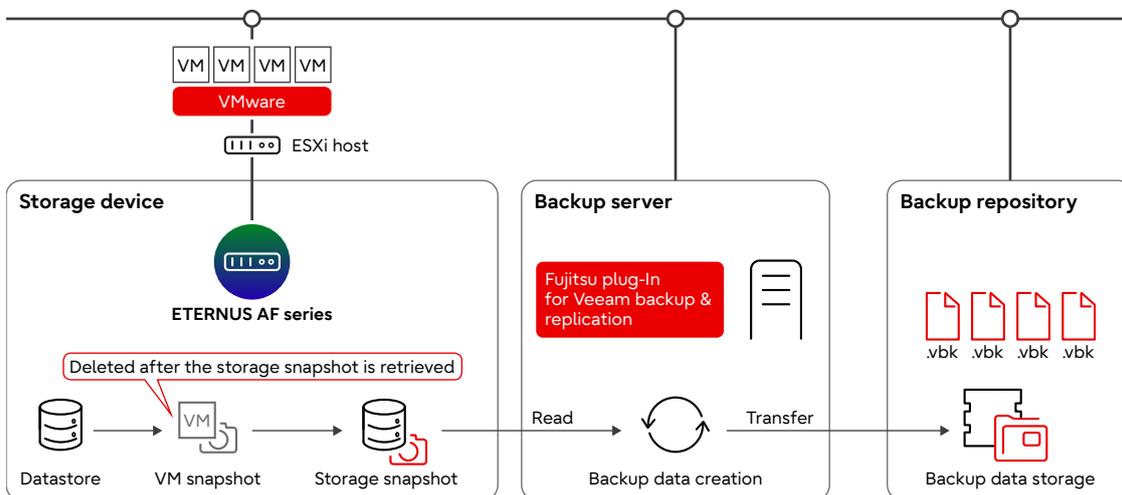
The storage snapshot is saved and is read in a separate area of the storage system from the datastore and VM snapshot. The VM snapshot is automatically deleted after the storage snapshot is completed. Then, the storage snapshot is automatically deleted after the backup is completed.

The backup proxy reads the storage snapshot to create the backup data and then the backup data is transferred to the backup repository to be saved.

*1 Formally known as VMware vStorage APIs for data protection (VADP).

For the storage snapshot, the target is the virtual machine in the datastore allocated from the thin provisioning pool. Because storage snapshots are saved to an unused area in the thin provisioning pool, a separate storage destination is not necessary. Even for systems already implementing backup operations with Veeam Backup & Replication, Fujitsu plug-in for VBR can be easily installed without needing to redesign for storage snapshots.

Veeam Backup & Replication 9.5 (Update 4a or later) is required for Fujitsu plug-in for VBR. In addition, the firmware version of the ETERNUS AF S2/DX S4 must be V10L86 or later.

Fujitsu VBR plug-in support of ETERNUS storage cluster

The Veeam snapshot plug-in is also aware of storage cluster environments. When it comes to mission-critical data that must be available around the clock, a disaster-proof configuration is an absolute must. Fujitsu VBR plug-in is able to trigger a snapshot of the active transparent failover volumes (TFOV) available at the primary-site of the cluster. After failover has processed, the backup existing in backup repository can be restored to the corresponding TFOVs on the secondary site.

Storage Cluster in normal operation

`Active` — `Standby`

Backup server — Backup repository

Backup proxy — VM VM VM — **VMware** — Primary ESXi host

- Veeam **snapshot is possible from Storage Cluster Primary Site**
- Backup proxy reaches data via non-TFOV port from volume B

Storage #A (Primary)

TFOV A – Active (Snap source) → Snap-shot → Non-TFOV B (Snap target) → Backup

Storage #B (Secondary)

TFOV N – Standby (Copy of TFOV A)

← REC session →

Storage Cluster after manual failover

`Standby` — `Active`

Backup server — Backup repository

Backup proxy — VM VM VM — **VMware** — Primary ESXi host

- Backup **job can continue** after manual failover
- Restore from volume backup repository into vol A' is possible after failover

Storage #A (Primary)

TFOV A – Standby (Snap source) — Non-TFOV B (Snap target) → Backup

Storage #B (Secondary)

Restore — TFOV N – Active (Copy of TFOV A)

← REC session →

Non-stop operations with transparent failover in ETERNUS storage cluster configurations can be executed in both directions, either automatically or manually. The ETERNUS storage cluster offers a number of functions that safeguard businesses against disasters without complexity or high costs:
- The failover to the surviving system or the secondary site takes place automatically during a disaster; the secondary storage will take over identities and the data is still accessible; it is fully transparent to the hosts and applications and does not need any actions by system administrators

- All application accesses are maintained in real time
- All systems in the high-availability environment can be run productively during normal standard operations

The ETERNUS storage cluster also supports a manual failover process that is required in the event of planned power shutdowns, DR tests and non-disruptive upgrades. Configuration hint: Fujitsu VBR plug-in in combination with storage cluster requires at least version 1.1.3 of the plugin and ETERNUS DX/AF firmware V11L40 or higher.

Verification of Fujitsu plug-in for VBR

Overview

This section verifies the effectiveness of Fujitsu plug-in for VBR.
- Reduced VM snapshot lifetime
- Validation of offloaded backup load (CPU load and throughput to the datastore) from the production server

Assumption: Production server-based user applications update data at a rate of 5 GB per minute in the datastore during the backup runtime.

Measurements of both the time needed to store VM snapshots and the backup load on the production server running user applications confirm the effectiveness of the Fujitsu plug-in for backup operations of VBR.
The verification configuration is as follows.
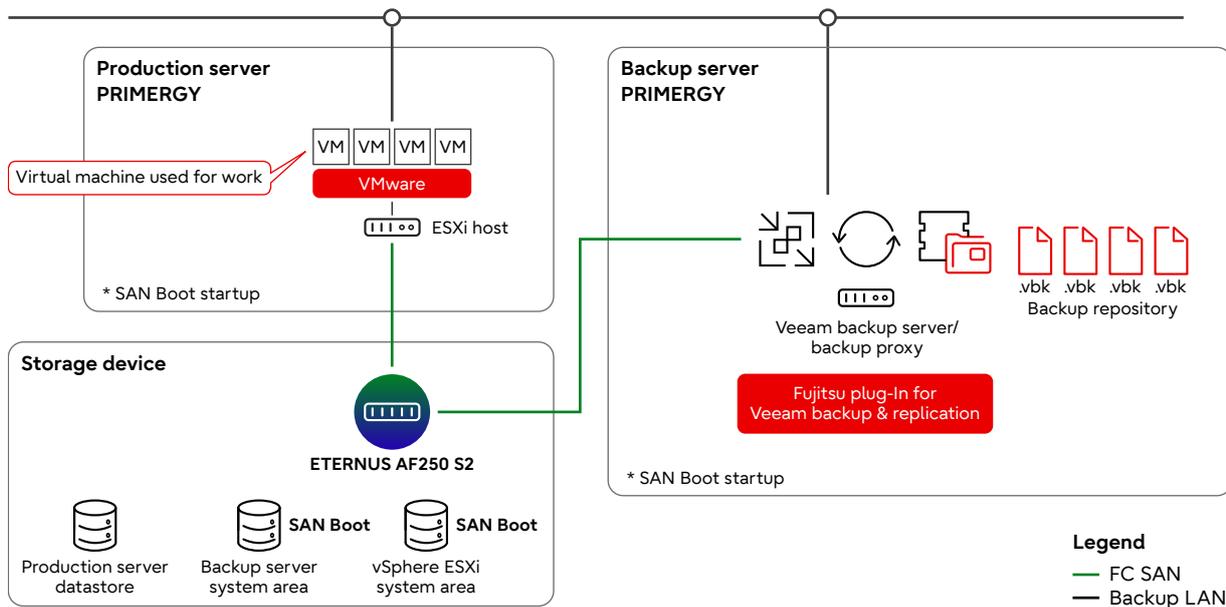
The devices and software used in the above configuration are as follows.

Name	Model	Remark
Production server	PRIMERGY	Resources allocated to each VM production server (per server): 1 vCPU, 4 GB of memory
Backup server	PRIMERGY	
Storage device	ETERNUS AF250 S2	Thin provisioning pools are configured with flash

Name	Product, Version	Remark
Hypervisor	VMware vSphere 6.7	vSphere ESXi
Guest OS	Windows Server 2016 Datacenter	
Backup server OS	Windows Server 2016 Datacenter	Physical server
Data protection	Veeam Backup & Replication 9.5 update 4a	
Plug-in	Fujitsu plug-in for Veeam Backup & Replication 1.0	

Settings

Registering the ETERNUS AF/DX

Register a storage system using the STORAGE INFRASTRUCTURE wizard of the Veeam Backup & Replication console.
For details about storage registration, refer to the manual for Veeam Backup & Replication.
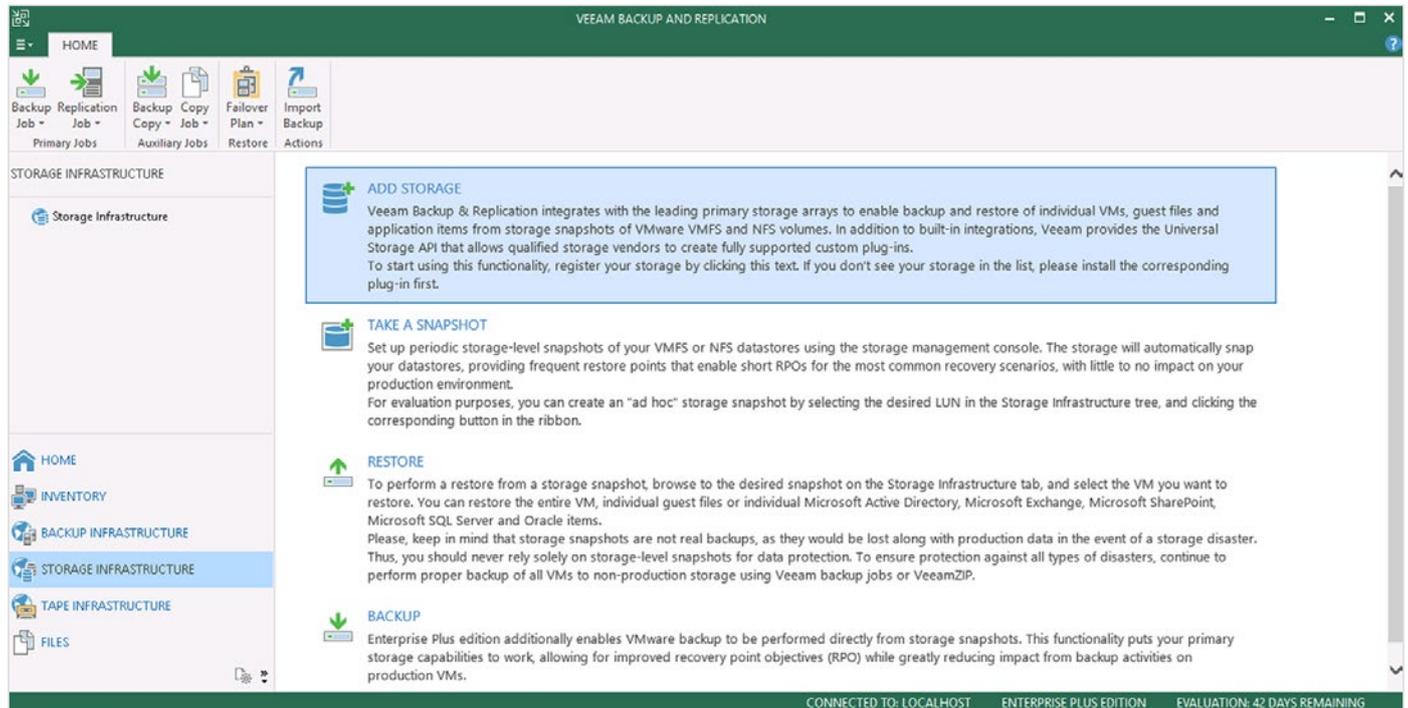
Installation of Fujitsu plug-in for VBR enables ETERNUS DX/AF to be selected when adding a storage system.
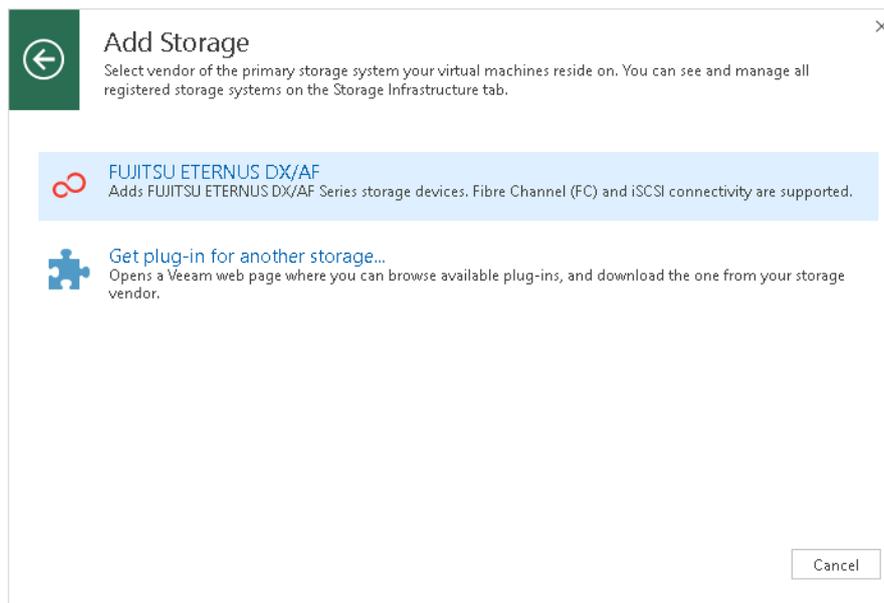
Configuring backup jobs with storage snapshots

In the backup job settings, select enable backup from storage snapshots on the integration tab of advanced settings. For details about the settings, refer to the manual for Veeam Backup & Replication.
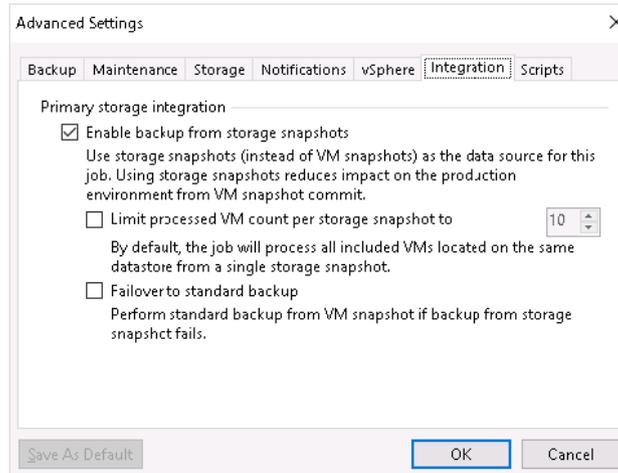
When a backup job is executed, the log displays 'creating storage snapshot', which confirms that the storage snapshots are enabled.
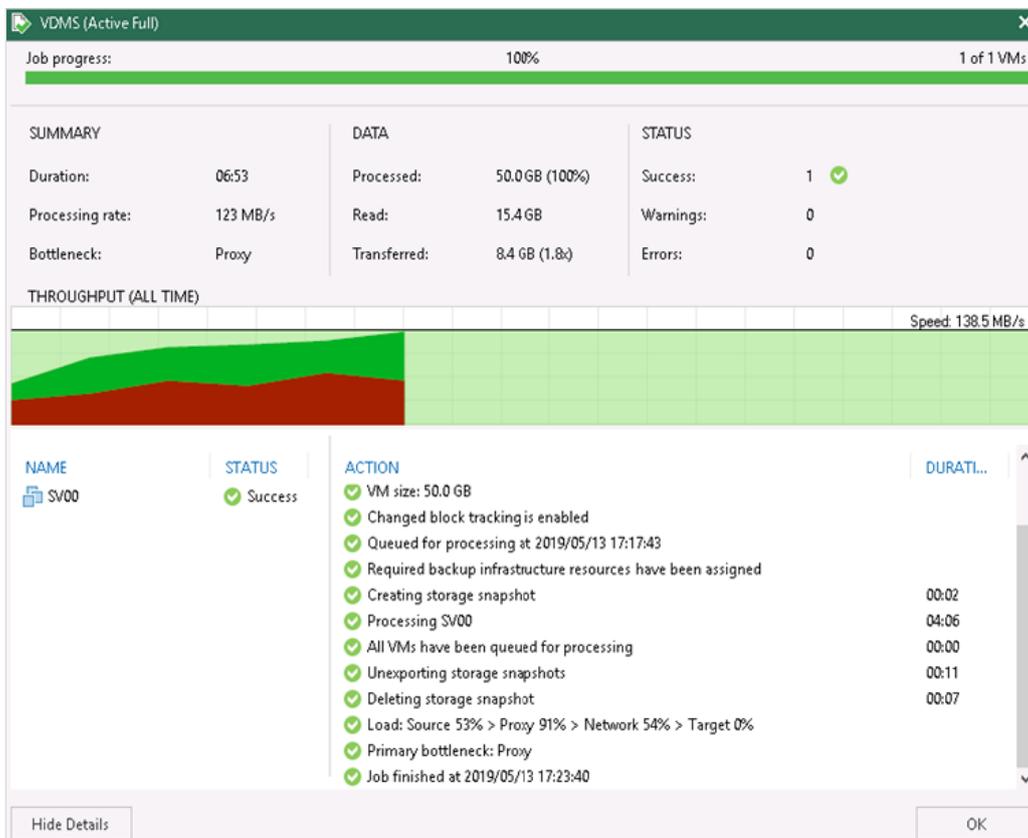
Results

VM Snapshot lifetime

Condition	Result	
Fujitsu plug-in for VBR/ storage snapshots	Backup runtime	VM snapshot lifetime
Not activated/Disabled	5 min 00 sec	3 min 05 sec
Activated/Enabled	3 min 39 sec	11 sec
Resulting improvement	**1 min 21 sec**	**2 min 54sec**

When storage snapshots are enabled, the backup time is reduced by 1 minute and 21 seconds (about 27%) and similarly, the VM snapshot lifetime is reduced by 2 minutes and 54 seconds (about 94%) when storage snapshots are enabled.

Offloaded CPU load from the production server

The verification is performed when the CPU load from the user application is 10%. When Fujitsu plug-in for VBR is not activated, the CPU load during the backup process is as high as 20%, meaning that the load from the backup itself is 10%.

When Fujitsu plug-in for VBR is activated, the CPU load remains at less than 10%, meaning that there is no load from the backup because the load is almost the same as that of the user application.

Througput to the production server datastore

Throughput
(MB/s)

1,000

800

600

400

200

0

3min 05sec

Offloaded
backup load

Data update of the
production server

Elapsed time

5min 00sec

Fujitsu plug-in for VBR:
not activated

Throughput
(MB/s)

1,000

800

600

400

200

0

11sec

Offloaded
backup load

Data update of the
production server

Elapsed time

3min 39sec
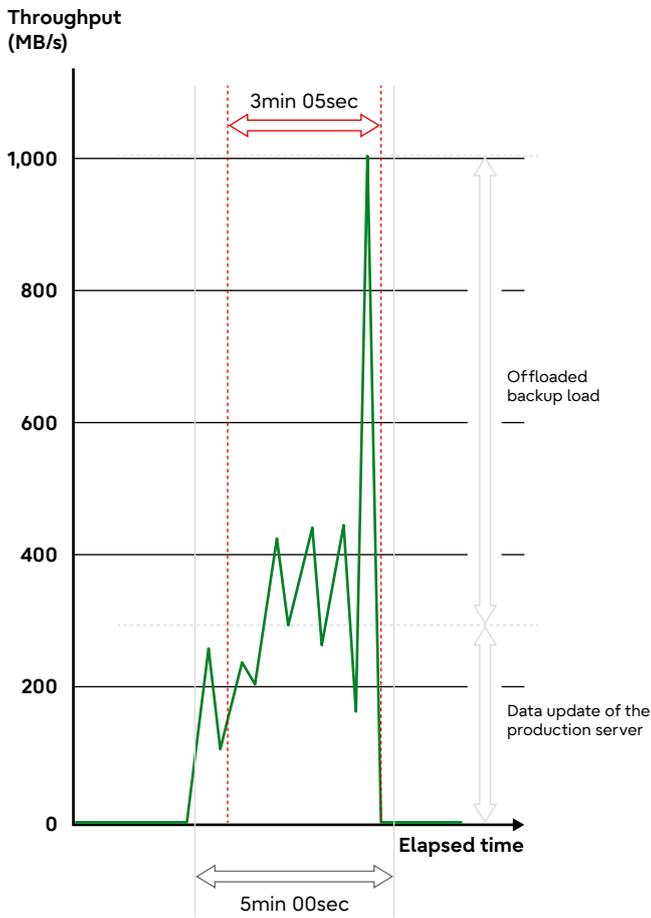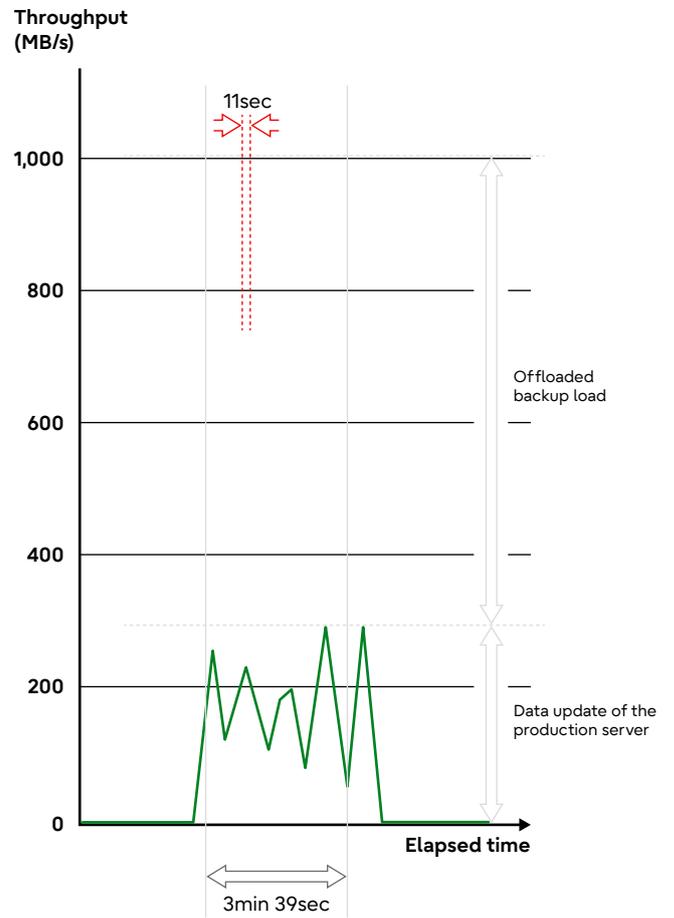
Fujitsu plug-in for VBR:
activated

Legend

VM snapshot lifetime

Backup runtime

When the Fujitsu plug-in for VBR is not activated, during the lifetime of the VM snapshot, the minimum throughput rate to the datastore hovers around 200 MB/s in the beginning and then spikes up to 1000 MB/s towards the end. This heavy increase occurs because the VM snapshot must be committed. Thus, the backup process generates a large amount of additional throughput. If the Fujitsu plug-in for VBR is in use, the throughput rate during the backup runtime is mainly caused by the user application. The amount of throughput resulting from the backup process itself is negligible.

Summary

The results of the Fujitsu plug-in for VBR verification are as follows.
- Backup time is reduced by about 27%
- VM snapshot lifetime is reduced by about 94%
- CPU load and throughput to the datastore from backing up the production server are offloaded to the storage system

The following graph shows the performance impact on the production server.

Legend

Fujitsu plug-in for VBR: **not activated**

Fujitsu plug-in for VBR: **activated**

VM snapshot lifetime:

Fujitsu plug-in for VBR: **not activated**

Fujitsu plug-in for VBR: **activated**

Percentage of CPU used

11sec

Period when work is not affected

40

20

0

Elapsed time

3min 05sec

Throughput (MB/s)

11sec

Period when work is not affected

1,000

800

600

400

200

0

Elapsed time

3min 05sec
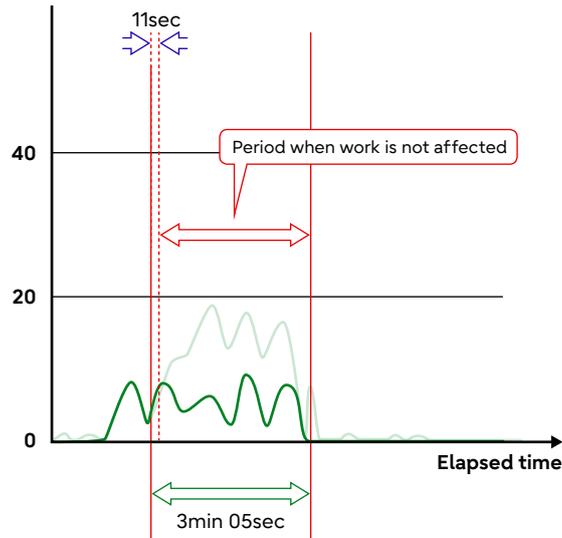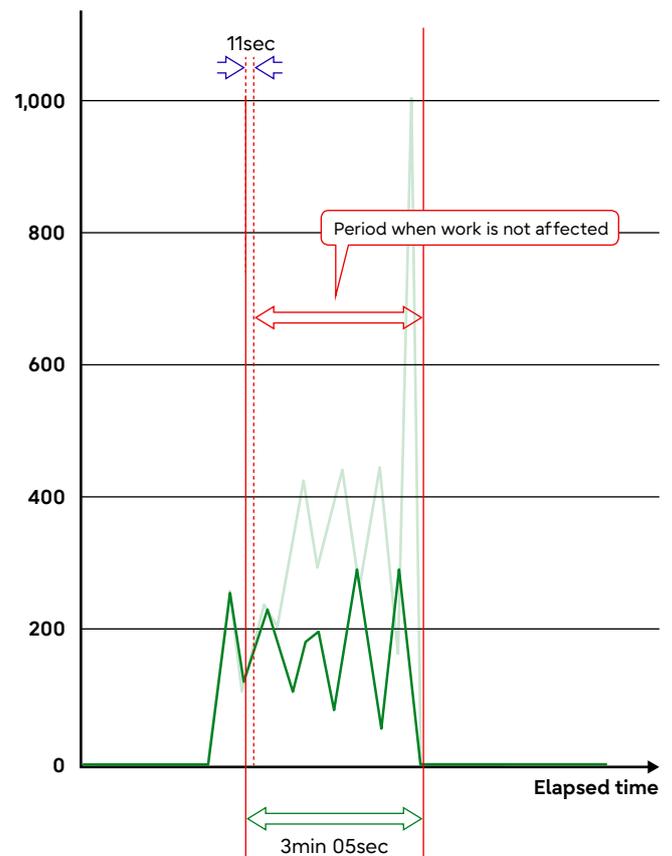
When Fujitsu plug-in for VBR is activated, both the CPU load and the datastore throughput are reduced when a backup is performed during the VM snapshot lifetime. By reducing the lifetime dramatically and offloading the load during the backup, Fujitsu plug-in for VBR allows backups to be performed any time during business hours.

Conclusion

By using Fujitsu plug-in for Veeam Backup & Replication, backups can be created without affecting the production server. Backup operations can be performed easily, without worrying about how the backup time affects the production server. The Fujitsu Storage ETERNUS AF S3/S2 series, ETERNUS DX S5/S4 series and Fujitsu plug-in for Veeam Backup & Replication are the solutions to the problems associated with the long period of keeping VM snapshots when creating virtual environment backups.

The combination of Veeam Backup & Replication and Fujitsu plug-in for Veeam Backup & Replication with the Fujitsu Storage ETERNUS AF S3/S2 series, ETERNUS DX S5/S4 series provides an optimal backup solution for virtual environments.

Related websites

Internet: Storage partner Veeam at Fujitsu https://www.fujitsu.com/global/products/computing/storage/veeam/

Veeam software website Veeam: https://www.veeam.com/
Fujitsu: https://www.fujitsu.com/emeia/products/computing/storage/software/backup-archiving/veeam-software/

Download Fujitsu plug-in for Veeam Backup & Replication from the Veeam software website
https://www.veeam.com/backup-replication-download.html

Download a trial version of Veeam Backup & Replication
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Fujitsu Storage ETERNUS DX series, Fujitsu Storage ETERNUS AF series
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