Cloud Volumes Service for Google Cloud

Managed Windows File Service
for Enterprise Applications

Windows SMB Reference
Architectures

◫ NetApp | ☁ Google Cloud

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Introduction

As organizations aim to run enterprise apps in Google Cloud, or to modernize existing apps and build new ones, the available options for managing Windows file share (SMB) requirements in the application's data layer workflows can seem limiting. Factors such as data management, high availability, scaling capacity and performance, and reliability at the right cost can create barriers to successful implementation. Users don't want to compromise on all the application best practices they've learnt over the years by running SMB-based workloads on-premises. Public cloud should simplify the management and complexity of the data layer, while giving end users control and a seamless experience. NetApp and Google shared this mindset when we launched our joint service: NetApp Cloud Volumes Service for Google Cloud. The service is a fully managed offering that supports both NFS and SMB-based workloads. In this document, we'll review how customers can leverage NetApp Cloud Volumes Service, the fastest storage on Google Cloud.

Why Netapp Cloud Volumes Service for Windows workloads in Google Cloud

The following subsections outline the key benefits of Cloud Volumes Service for Google Cloud Platform.

Zero impact changes: average cost savings of around 70%

By using Cloud Volumes Service for Google Cloud, you can control your cloud performance by dynamically adjusting performance among three service levels. For an increase in performance, you can increase the capacity allocation (for example, 10TB provides 160MB/s); you can also choose a higher service level.

- The Standard service level offers economical cloud storage, at just $0.10 per gibibyte per month. It enables throughput of up to 16 MB/s for each tebibyte allocated. This level is ideal as a low-cost solution for infrequently accessed data.

- The Premium service level delivers a good mix of cost and performance. At a cost of $0.20 per gibibyte per month, it offers four times the performance of the Standard level, with 64 MB/s for each tebibyte allocated. This is a good fit for many applications where data capacity and performance needs are balanced.

- The Extreme service level provides the best performance. At a cost of $0.30 per gibibyte per month, it enables up to 128 MB/s for each tebibyte allocated, and Cloud Volumes Service can scale to deliver several GB/s for reads and writes. The Extreme service level is the best fit for high-performance workloads.

One of the unique features of NetApp Cloud Volumes Service for Google Cloud is the capability to change performance on demand without impacting the availability to the application or users. Thus, if users need Extreme performance for just two hours a day and Standard performance for the remainder, you can use API calls or a scheduler in Linux to automate that process, resulting in significant cost savings at scale.

High performance

With consistently high performance of over 400k IOPS, Cloud Volumes Service provides shared persistent storage with high throughput and low latency. It easily meets the demands of large-scale application environments. Some examples of applications that leverage shared files systems and databases in their workflows are:

- Energy/oil & gas: Petrel application workflows
- Media and entertainment: Rendering and Digital Asset Management workflows
- Retail and finance: Core business applications, CRM, ECM, SAP-based applications
- Analytics and machine learning pipelines

Increased resilience with snapshots

You can easily create a snapshot of an application's volume using NetApp® Snapshot™ technology. Snapshots act as logical backups. They're point-in-time representations of your data that allow you to restore your database or shared file systems without downtime. You can create a snapshot manually or schedule creation by using the Cloud Volumes Service API, gcloud CLI, or the graphical user interface (GUI).

Snapshot are fast, easy, and nondisruptive. A NetApp snapshot creates a "frozen" read-only view of a volume that enables your applications to access older versions of files and directory hierarchies without additional workflows. Snapshot creation takes only a few seconds (typically less than 1 second), regardless of the size of the volume or the level of activity within the environment.

Faster time-to-market with easy copies
Most organizations need multiple copies of their data for testing and development. Software development pipelines require multiple copies for a variety of uses; creating and refreshing those copies is cumbersome. Typically, creating copies is a time-consuming and tedious process to manage as the number of copies increases. Cloud Volumes Service for Google Cloud enables you to create a near-instant copy using snapshots. It significantly improves the release cycle from development to stage and production. The process can be scripted using Cloud Volumes Service APIs, which leads to a quicker time to market.

High availability
NetApp Cloud Volumes Service for Google Cloud is a regional service. That means application instances in any of the Google Cloud zones in each region can access the same SMB volume, without having to manually create a zonal Linux cluster that you have to manage. The regional design also leads to cost savings (avoiding unnecessary zonal egress charges)

and more importantly, the service is unaffected by zonal outages. For protection from a regional outage, you can also choose to replicate the data in a cloud volume in each region to another region of your choice (egress charges will apply).

Security and encryption
NetApp Cloud Volumes Service uses at-rest encryption, relying on the XTS-AES 256-bit encryption algorithm. Cloud Volumes Service encrypts your data without compromising your storage application performance. NetApp manages and rotates encryption keys for you. This single-source solution can increase your organization's overall compliance with industry and government regulations without compromising user experience.

SMB Solution Architectures

SMB service in a hybrid cloud
Often, organizations require hybrid application topology, spanning on-premises application clusters and instances in Google Compute Engine to access the same data set.

A client in an on-premises data center can access an SMB cloud volume with a Dedicated Interconnect, as depicted in the reference architecture below. Global Dynamic Routing needs to be enabled on the VPC for on-premises access, allowing the Cloud Routers to import and export custom routes that can be added.
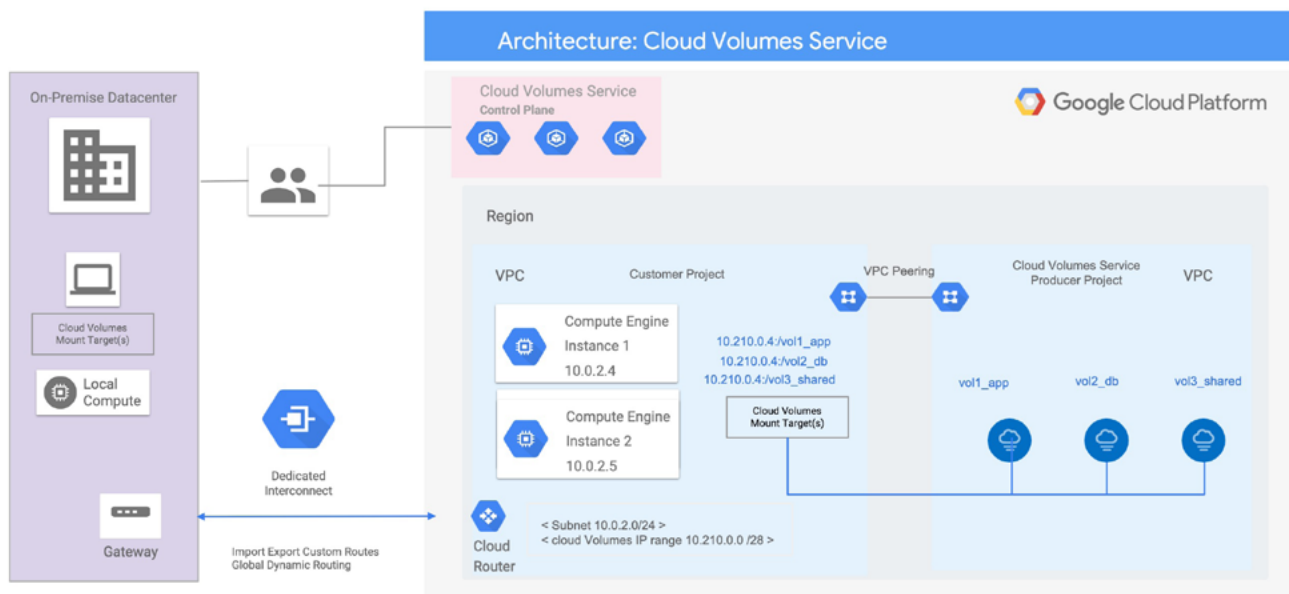
In the previous diagram, you can see that we have multiple VM application instances in Google Compute Engine, VM Instance-1 and VM Instance-2.

VM instances   ⊞ CREATE INSTANCE   ⬇ IMPORT VM   ↻ REFRESH   ▶ START / RESUME   ■   II   ⏻   🗑   +⚑ MANAGE ACCESS   SHOW INFO PANEL   ⬡ LEARN

Name : instance-1 ⊗   Filter VM instances   ✕   ⦿   Columns ▾

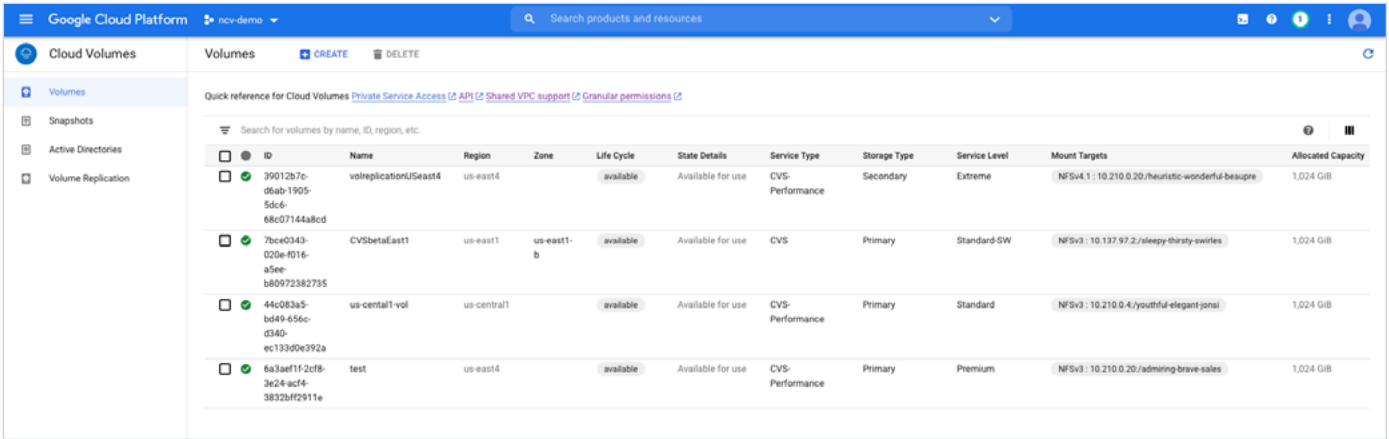|	Name ∧	Zone	Recommendation	In use by	Internal IP	External IP	Connect
☐ ◯	instance-1	us-central1-a			10.0.2.13 (nic0)	None	SSH ▾ ⋮
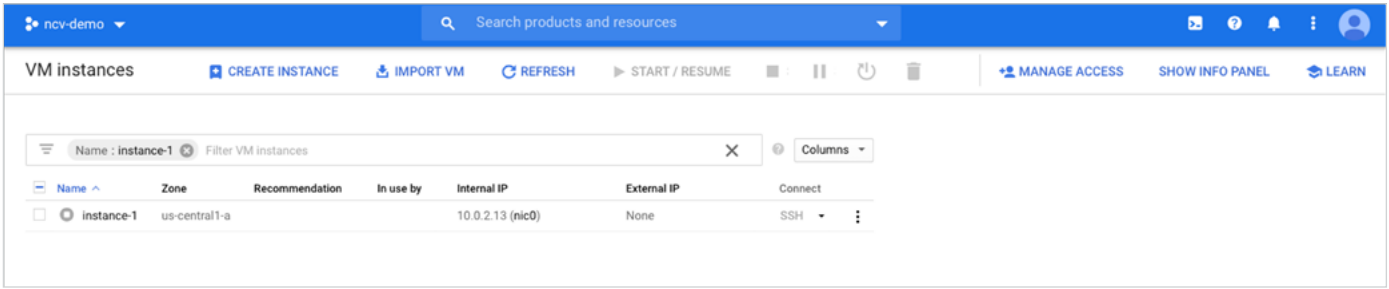
In NetApp's producer project and VPC, we have three application volumes that were created to serve database needs, core application needs, and shared files repository.

Both application instances can share the same SMB volume, which is managed by NetApp and Google teams, and users have control over the service level and capacity, both of which can be changed on demand without impacting the workflow.
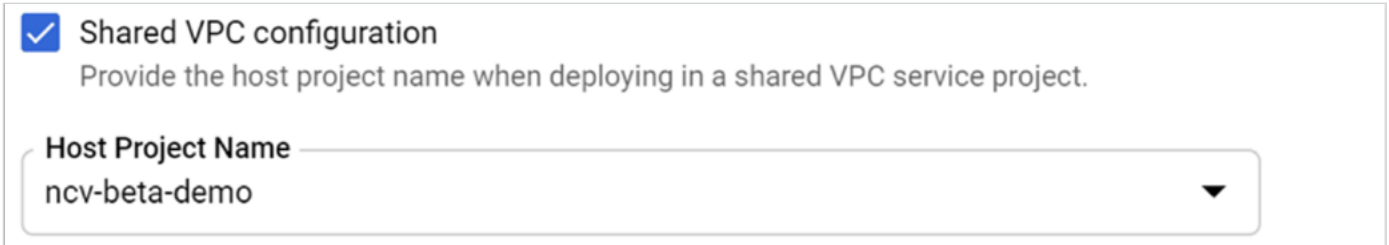
Users can easily mount the volumes to application instances by copying and pasting the instructions available under "show more" in the screenshot below.

≡   Google Cloud Platform   ❖ ncv-demo ▾   Search products and resources   ⌄

Cloud Volumes   Volumes   ⊞ CREATE   🗑 DELETE   ↻

- Volumes
- Snapshots
- Active Directories
- Volume Replication

Quick reference for Cloud Volumes Private Service Access ⧉ API ⧉ Shared VPC support ⧉ Granular permissions ⧉

Search for volumes by name, ID, region, etc.   ⦿   ▥

		ID	Name	Region	Zone	Life Cycle	State Details	Service Type	Storage Type	Service Level	Mount Targets	Allocated Capacity
☐	✓	39012b7c-d6ab-1905-5dc6-68c07144a8cd	volreplicationUSeast4	us-east4		available	Available for use	CVS-Performance	Secondary	Extreme	NFSv4.1 : 10.210.0.20/heuristic-wonderful-beaupre	1,024 GiB
☐	✓	7bce0343-020e-f016-a5ee-b80972382735	CVSbetaEast1	us-east1	us-east1-b	available	Available for use	CVS	Primary	Standard-SW	NFSv3 : 10.137.97.2/sleepy-thirsty-swirles	1,024 GiB
☐	✓	44c083a5-bd49-656c-d340-ec133d0e392a	us-central1-vol	us-central1		available	Available for use	CVS-Performance	Primary	Standard	NFSv3 : 10.210.0.4/youthful-elegant-jonsi	1,024 GiB
☐	✓	6a3aef1f-2cf8-3e24-acf4-3832bff2911e	test	us-east4		available	Available for use	CVS-Performance	Primary	Premium	NFSv3 : 10.210.0.20/admiring-brave-sales	1,024 GiB

SMB service in Google Cloud
Users can access SMB-based NetApp cloud volumes that exist in the Google cloud landscape, even across multiple regions, in a standalone or shared VPC topology.

During the volume creation workflow, users must enable the shared VPC topology and select their host project. Compute resources in the service projects can then access the cloud volumes' mount targets through the host project.

☑ Shared VPC configuration
Provide the host project name when deploying in a shared VPC service project.

Host Project Name
ncv-beta-demo   ▾

Note: For production and business critical workflows, we recommend minimizing cross-region or on-premises access to avoid increased latency.

In the below example, you can see how multiple application instances can access shared binaries and log files in a secure, centralized, and cost-effective manner, running on Cloud Volumes (SMB).

When deploying SMB-based applications, users can take advantage of the following features for increased security and automation.
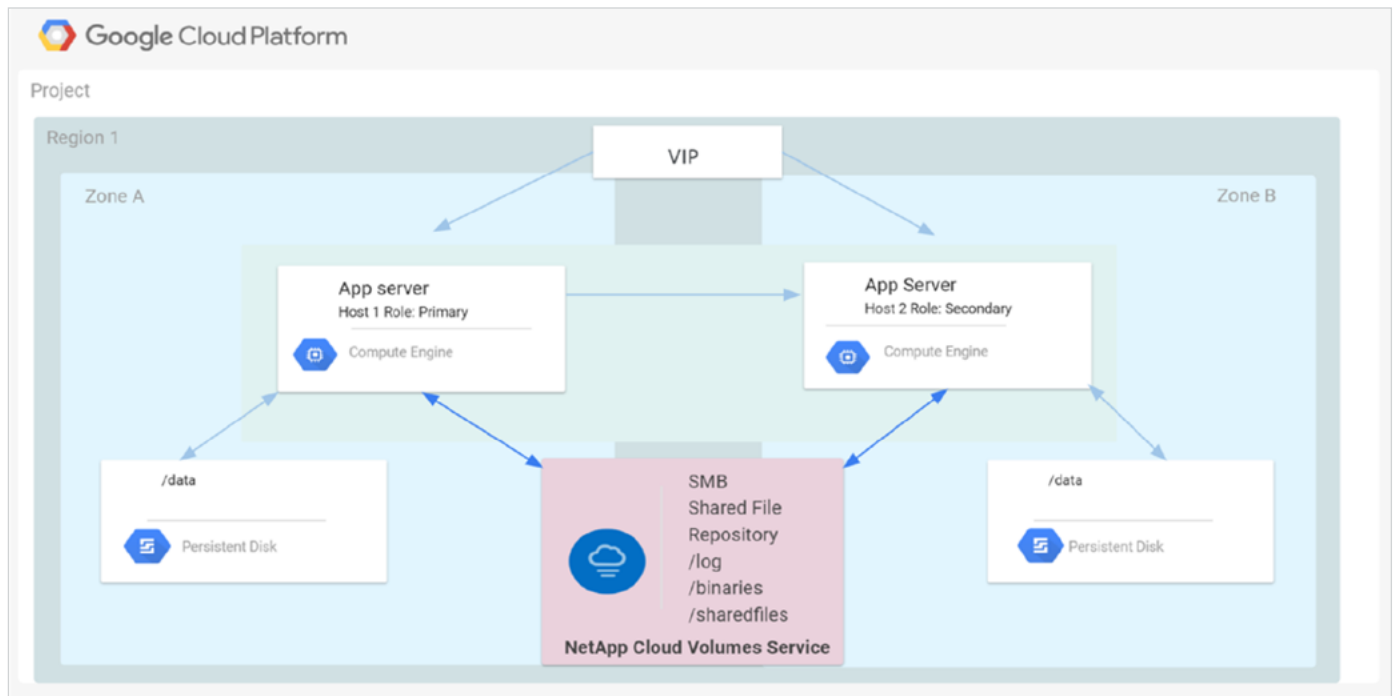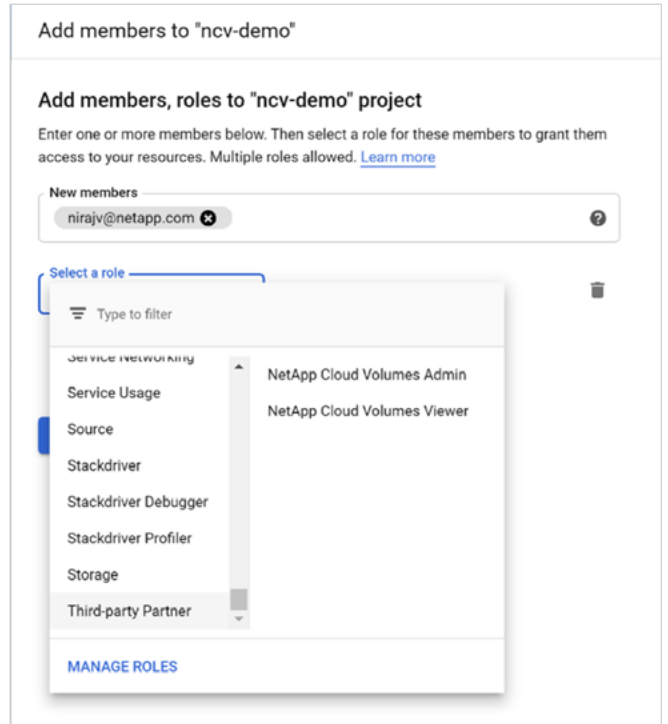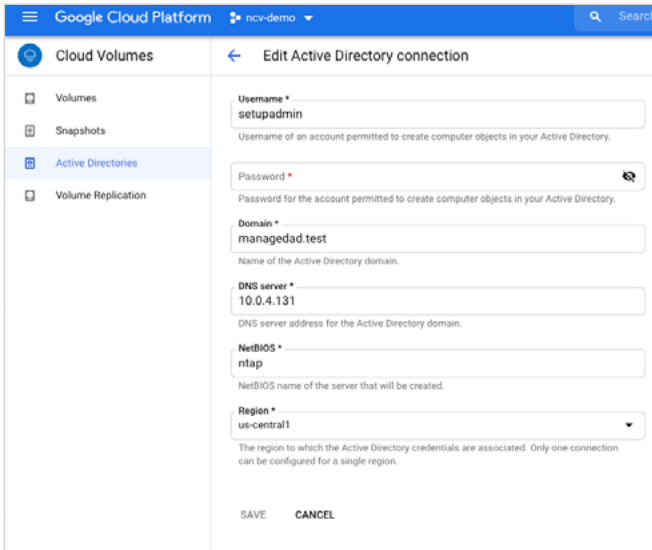

Active Directory Integration

Customers can leverage the built-in active directory (AD) integration to securely create SMB volumes. A one-time connection (per region, per project) needs to be setup with the AD server, using administrator credentials as shown below.

Global, user-accessible API

Customers can now interact with Cloud Volumes Service via API and programmatically list, create, update, and delete objects (volumes, snapshots, for example), meaning customers can provision cloud volumes as part of an automated application-deployment package, create application-consistent snapshots, and use other automation frameworks. The API is global, which means customers can interact with a single endpoint and specify regions as location parameters in the URL. Authentication and authorization to access the Cloud Volumes Service API is integrated with GCP service accounts and IAM. See the underlined documentation for more details.

Granular roles

To increase security for users and to enable automation via service accounts, Cloud Volumes Service supports two granular roles:

- netappcloudvolumes.admin
- netappcloudvolumes.viewer

These roles can be assigned to users or service accounts to perform Cloud Volumes Service actions. See the documentation for details about how to use these roles.

How does Cloud Volumes Compare to Google Cloud Offerings?

	NetApp Cloud Volumes	Google Cloud Filestore Basic	Google Cloud Filestore High Scale
Summary	Fully managed service Integrated directly into the GCP UI. Service is GA as of Nov. 20, 2019 Designed for scale-up workloads	No Support for SMB, No Support for AD	No Support for SMB, No Support for AD
Protocols	NFSv3, SMB		
Data Management	Yes		
• Replication	• Replication: No (coming soon)		
• Copy	• Copy: Yes		
• Snapshots	• Snapshots: Yes		
• Data sync	• Data sync: Yes		
• Integrated backup	• Integrated backup: No		
High/extreme performance, low latency	Yes Standard (16MB/s) Premium (64MB/s) Extreme (128MB/s) change on demand, scales with capacity		
Availability	AZ failure tolerant 99.9% (depends on region)		
Scale	100 TB – can change on demand Future multi PBs		
Billing/Support	Google Cloud		

The Cost Benefits of NetApp Cloud Volumes Service

In addition to obviating the need for infrastructure you need to manage, NetApp cloud volumes is also the lowest cost, highest quality storage solution for SMB volumes in Google Cloud. Instead of deploying and managing virtual machines, storage devices and operation systems, you can simply consume volumes. In addition, three performance tiers allow you to optimize for your workload and spending requirements. Choose from Standard, Premium, and Extreme tiers. The table below compares using NetApp Cloud Volumes to renting virtual machines and running an HA Windows File Server. The "roll your own" shows the necessary doubling of the infrastructure in order to match the availability offered by NetApp.

Requirement	NetApp Cloud Volumes	"Roll your own HA File Server"
Capacity	50TiB	50TiB
Monthly Storage Costs	$5,120 (50TiB x Standard Service Level @ $0.10 per gibibyte/month snapshots included)	$17,408 (50Tib x Persistent Disk – Regional Provisioned SSD, snapshots not included)
Annual Storage Costs	$61,440	$ 208,896
Compute/VM Costs Monthly	$0	$ 401.78 (2x n1-standard-4 with 2x 375gb local SSD)
Compute/VM Costs Annual	$0	$4,821.36
TCO (yearly)	$61,440	$213,717.36
Savings	~70% savings	

About NetApp

In a world full of generalists, NetApp is a specialist. We're focused on one thing, helping your business get the most out of your data. NetApp brings the enterprise-grade data services you rely on into the cloud, and the simple flexibility of cloud into the data center. Our industry-leading solutions work across diverse customer environments and the world's biggest public clouds. As a cloud-led, data-centric software company, only NetApp can help build your unique data fabric, simplify and connect your cloud, and securely deliver the right data, services and applications to the right people—anytime, anywhere. Learn more at www.netapp.com.

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