NetApp

How to Deploy Moodle With

CLOUD VOLUMES
ONTAP®

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Introduction

This guide explains step-by-step how to deploy Moodle with Cloud Volumes ONTAP®, NetApp's enterprise-grade data storage management platform, using either iSCSI or NFS in Linux. Cloud Volumes ONTAP provides a layer of data management features that can transform your learning platform while reducing your cloud storage costs.

About Moodle

Moodle is a leading open source learning management system (LMS) platform that provides teachers, administrators and students with a customized learning environment that is secure, robust, and integrated.

Moodle offers users an accessible and easy interface that comes with dashboard personalization, collaboration tools, calendars, file management resources, built-in support for media files, and much more. Using Moodle, class sites can be customized and designed, courses can be created and assigned, payments can be made via PayPal, and workflows can be established for class projects.

Moodle's core APIs can be used by developers to configure the platform. Moodle supports the IMS-LTI and SCORM open standards that allow the LMS to integrate with other learning software. It also provides logs, reporting, and notifications. Moodle has a high level of interoperability with custom plugins and other applications, such as Cloud Volumes ONTAP.

Moodle end-users expect the system to be both highly performant and highly available. These requirements, however, are difficult to achieve cost-effectively if Moodle's web server and database are deployed on an on-premises infrastructure. In order to provide a frictionless user experience while containing costs, the Moodle shared file system and database must be able to scale elastically in response to volatile demand. Thus, it is not unusual for Moodle to be deployed on a cloud infrastructure.

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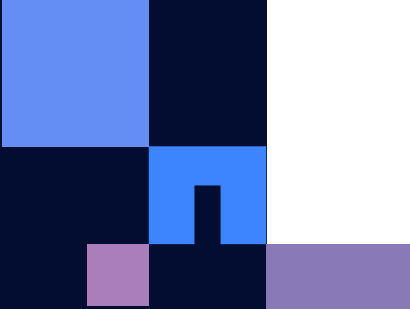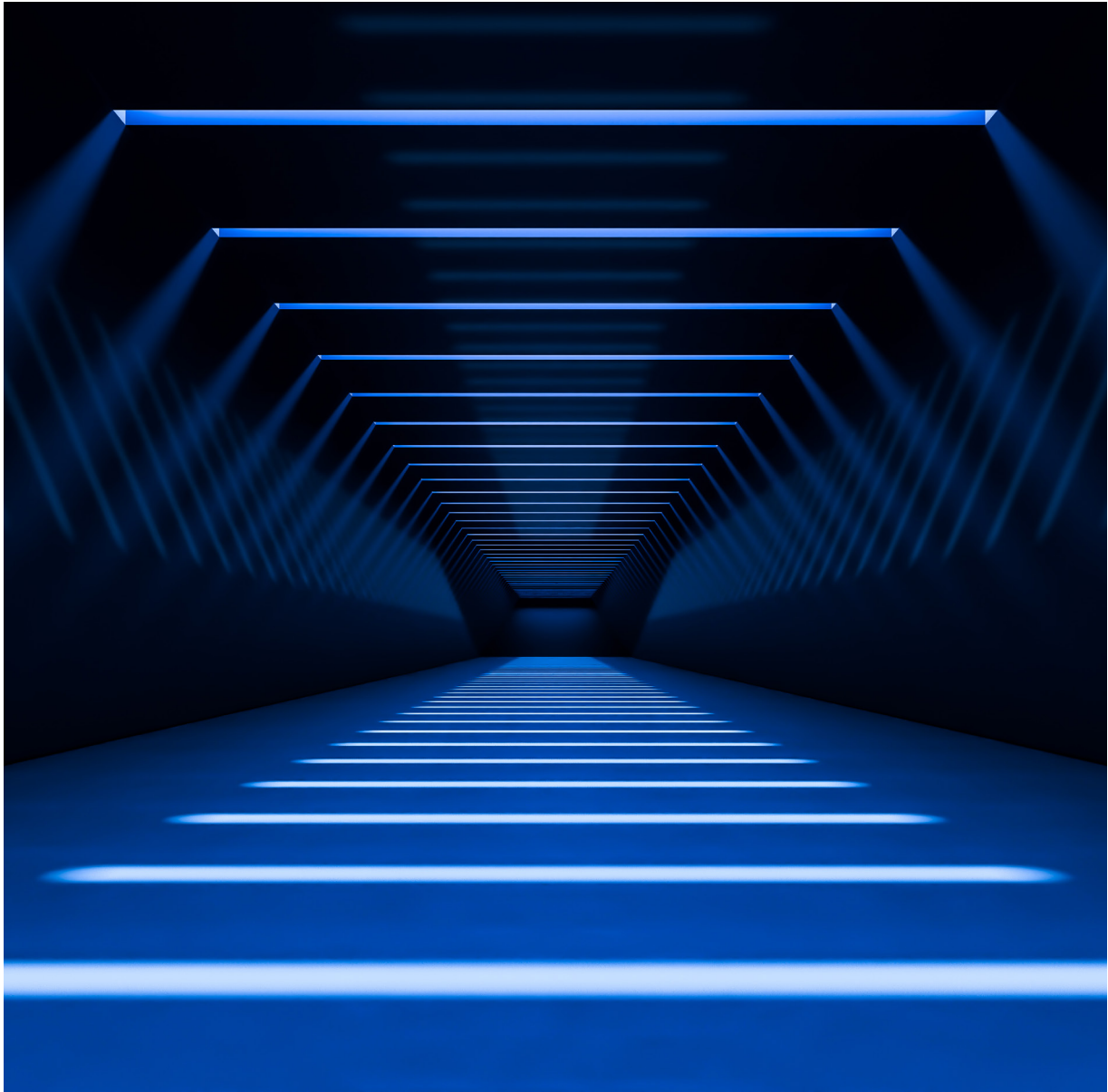
Why Cloud Volumes ONTAP for Moodle

To run Moodle in the cloud, users can take advantage of NetApp's Cloud Volumes ONTAP. The Cloud Volumes ONTAP data management platform is a software-defined storage solution that leverages AWS and Azure cloud compute and storage resources to create a highly-efficient, secure, and scalable virtual storage appliance for serving NFS, SMB / CIFS file shares as well as iSCSI block storage, and for hosting databases. Its key features for Moodle users include:

High availability
A dual-instance architecture in AWS or Azure to ensure that interruptions do not cause data loss (RPO=zero) or extended Moodle downtime (RTO<60 seconds).

Data protection
NetApp Snapshots™ technology creates rapid, efficient, point-in-time copies of storage volumes. The same technology is used by Cloud Volumes ONTAP for disaster recovery processes.

Backups
Cloud Volumes ONTAP's replication functionality automatically and cost-effectively keeps secondary and tertiary Moodle data backup sites up-to-date.

Reduced storage footprint
Built-in storage efficiencies (deduplication, compression) as well as thin provisioning and automated storage tiering can save up to 70% of data storage costs.

Single-pane control
Through the intuitive OnCommand® Cloud Manager control console you can easily set up storage systems, provision disks and volumes, and create new file shares for your Moodle deployment.

In summary, with Cloud Volumes ONTAP Moodle users gain all the benefits of deploying Moodle with the public cloud together with industry-leading levels of high availability as well as the scalability and data protection that databases and shared file storage require. The next section provides step-by-step instructions for deploying Moodle using Cloud Volumes ONTAP.

Deploying Moodle with Cloud Volumes ONTAP

Basic Requirements

- A working web server, such as Apache.

- A database, such as MySQL, MariaDB, or PostgreSQL, with PHP configured.

- See the Moodle release notes for additional software requirements.

- There are various PHP extensions required by Moodle. You will be notified early in the Moodle installation process if a PHP extension is missing. After installing the extensions, restart the Moodle install script.

- If you want Moodle to send emails you will also need a working SMTP server.

Getting Moodle

There are two options for getting Moodle:

- Download the required version from http://moodle.org/downloads.

- The code itself can be taken from the Git repository, as described below. This is the recommended option for developers and it also simplifies upgrading.

GETTING MOODLE FROM GiT

Fetch a complete copy of the Moodle repository and switch to the 3.6 Stable branch:

```
git clone -b MOODLE_36_STABLE git://git.moodle.org/moodle.git
```

See Git for Administrators for details on using Git to install Moodle code.

NOTE | Moodle should be downloaded only from sources that can be found on moodle.org. Although you may be able to find other Moodle download resources, they aren't guaranteed to properly work and are not upgradable or supported.

Using Cloud Volumes ONTAP for Moodle Web Services and Database

Deploying Moodle Using iSCSI in Linux

1 INSTALL LINUX UNIFIED HOST UTILITIES

- Download the supported Linux Unified Host Utilities version from the NetApp Support Site at NetApp Downloads: Software.

- Follow the instructions in the installation documentation to install the Linux Unified Host Utilities software.

- If the tuned package is not installed, enter the following command:

```
yum install tuned
```

- For a physical host, ensure that the storage profile is set to:

```
tuned-adm profile enterprise-storage
```

- For a virtual host, ensure that the storage profile is set to:

```
tuned-adm profile virtual-guest
```

**2** RECORD THE iSCSI NODE NAME

- In order configure the storage system, you must first record the iSCSI initiator node name on the Linux host. The following steps should be carried out on the host side:

- In a text editor open /etc/iscsi/initiatorname.iscsi to view the iSCSI initiator node name, which will look something this:

```
Iqn.1994-05.com.redhat:127
```

- Write down the node name or copy it to a text file.

- Start iSCSI Services as follows:

```
systemctl restart iscsid
```
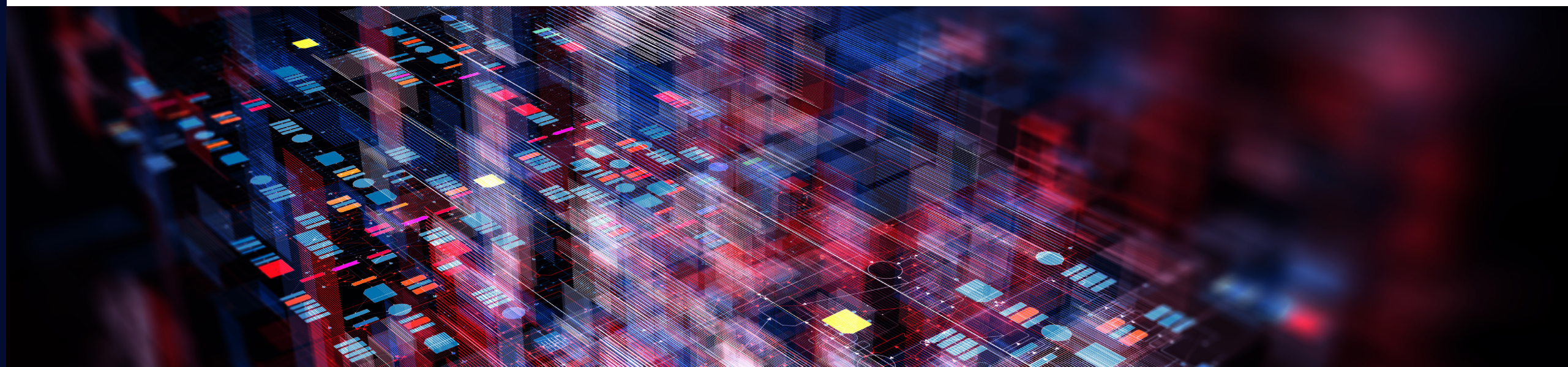
③ CREATE A LUN

- In a web browser enter the URL https://IP-address-of-cluster-management-LIF and login to System Manager using your cluster administrator credential.

- Navigate to the LUNs window.

- Click Create.

- Select the SVM wherein you'll create the new LUN. The Create LUN Wizard will now appear.

- When you reach the General Properties page, select the LUN type you will use as follows:

  - Windows 2008 or later. Select this option if your Windows host will be using the LUNs directly.

  - Hyper-V. Select this option if you are using Hyper-V VMs with VHD-containing LUNs.

  - In either case, make sure the Thin Provisioned checkbox is unselected.

- Once you are on the page for the LUN Container, select any FlexVol volume that is already there, while making sure that the volume has enough space on it. If the available space is insufficient on any of the existing volumes, create a new volume.

- On the Initiators Mapping page click Add Initiator Group:

  - Enter the required information on the General tab.

  - In the Initiators tab enter the iSCSI initiator node name that you recorded in Step 2.

- Make sure all of the details are correct, and then click Finish. The wizard will close.

1 CHOOSE A VOLUME TYPE

- In the Volumes tab in OCCM, click *Create New Volume*.

- On the Create New Volume page, select a volume type from the following options:

Option	Description
Create Volume	Creates a volume attached to a single AWS instance.
Create HA Volume	Creates a volume that is attached to a single AWS instance and is also mirrored to another instance to provide high availability in case of a failure. Click the Info icon to learn more about the instances required for an HA volume.

2 CREATE VOLUME OPTION

If you choose Create Volume, you must specify details for your first volume per the fields described in the table below.

Field	Description
Size	The maximum volume size is dependent on the capacity available in the existing storage systems. Note that Thin Provisioning is automatically enabled on the volume, allowing you to create a volume that is bigger than its currently available physical storage. Space is allocated dynamically to each volume as data is written.
AWS Disk Type	Choose the disk type that meets your performance and cost requirements: • General Purpose SSD: Suitable for a broad range of workloads, cost and performance are balanced, with performance defined in terms of IOPS. • Throughput Optimized HDD: Suitable for workloads that require fast and consistent throughput at a lower price, with performance defined in terms of throughput. • Cold HDD: Low-performance disks that are suitable for backups or infrequently accessed data. Performance is defined in terms of throughput.

The following image shows a typical Create Volume page:
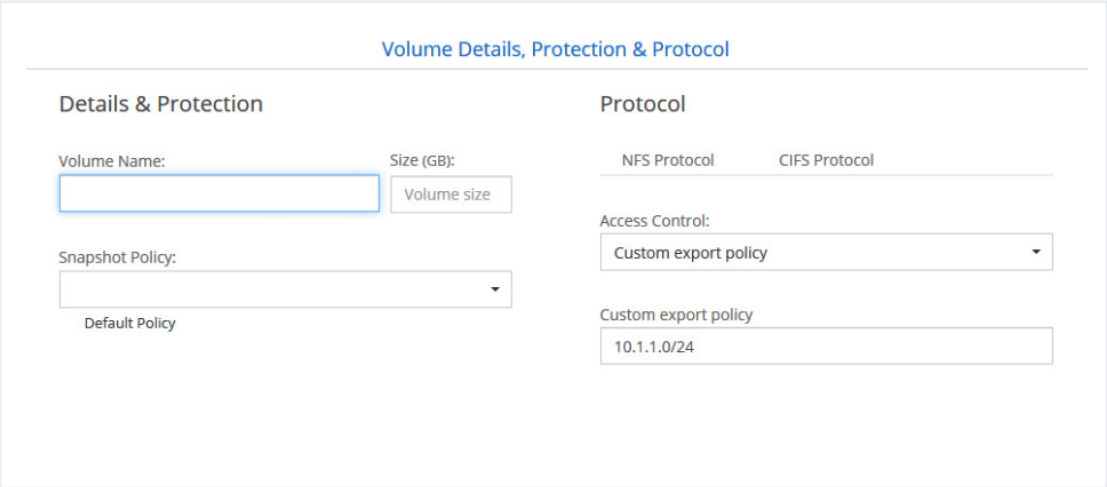
NOTE | For more details, refer to the AWS documentation on EBS volume types.

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3 CREATE HA VOLUME OPTION

- If you choose Create HA Volume, in addition to the Size and AWS Disk Type fields in the Create Volume page described above, you need to fill in the Location field, choosing a VPC that includes three subnets in three separate Availability Zones

- Then open the Nodes and Mediator page and fill in the additional fields described below.

Field	Description
Floating IP	The IP addresses must be outside the CIDR block for all VPCs in the region.
Route Table	With multiple route tables, it is of crucial important to make sure to select the correct tables to use. Failure to do so may lead clients to not have proper access to the HA pair. NOTE: For more details, refer to the AWS documentation on route tables.

The following image shows a typical Nodes and Mediator page, with each instance in a separate availability zone:

Nodes & Mediator			
Node 1	Availability Zone us-east-1d	Subnet 172.31.0.0/20	
Node 2	Availability Zone us-east-1c	Subnet 172.31.16.0/20	
Mediator	Availability Zone us-east-1b	Subnet 172.31.32.0/20	Key Pair EranVirginia

4 CREATE THE VOLUME

For either option (Create Volume, Create HA Volume), when you have finished completing the required fields click Create. Cloud Manager now creates the volume on an existing or a new system. In the case of a new system, it can take about 25 minutes to create the volume.

Mounting Volumes to Linux Hosts

After creating a volume, it must be mounted to your hosts so that they can access it.

- In the Volumes tab, hover the mouse over the volume, select the Menu icon, and click *Mount*.

- Click *Copy*.

- On your Linux hosts, modify the destination directory as necessary and then enter the Mount Volume command.

Moving Moodle Data to Cloud Volume ONTAP

Whether you chose NFS or iSCSI, you now need to move the data to the new path.

- Turn off http server and the MySQL services.

- Mount the LUN or NFS to a temporary location and sync the data from the current location to the new temporary location:

```
rsync -av source_location new_destination
```

- After the sync is complete, mount the LUN or the NFS to the same location as the web server data and the DB.

- Start the web server and the DB services.

About Cloud Volumes ONTAP

NetApp Cloud Volumes ONTAP® is the foremost enterprise-grade storage management solution, delivering secure, proven data control and storage management services for the AWS or Azure cloud. Cloud Volumes ONTAP addresses the challenges of a wide range of use cases and workloads including:

File services and NAS file shares, including support for NFS and SMB / CIFS	Disaster Recovery (DR), Backup and Archive
Databases – SQL, Oracle, NoSQL and more	SaaS Applications

DevOps

Big Data Analytics
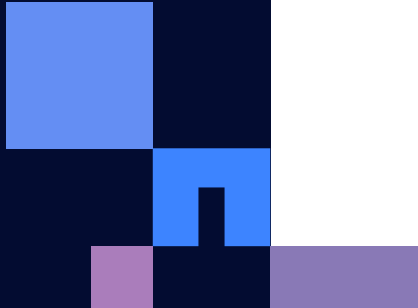
Cloud Volumes ONTAP
Key Feature

1 HIGH AVAILABILITY

No data loss (RPO=0) and minimal recovery times (RTO < 60 secs).

2 DATA PROTECTION

with NetApp Snapshots™ technology that requires no additional storage and does not impact application performance.

3 STORAGE EFFICIENCIES

Thin provisioning, data compression, and deduplication minimize storage footprint and costs.

4 DATA TIERING

Automatically and seamlessly moves infrequently-used data from block to object storage.

5 DATA CLONING

NetApp FlexClone® technology creates writeable cloned volumes instantly, with zero capacity penalty.

6 DATA REPLICATION

with SnapMirror® and Cloud Sync service.

7 DATA SECURITY

All data at rest is encrypted. In addition, efficient data snapshots support seamless failover, failback, restore and recovery processes.

8 CLOUD MANAGER

Single-pane enterprise-grade control, monitoring and governance.

9 AUTOMATION & ORCHESTRATION

Integrate automated and standardized processes through Cloud Manager or APIs.

10 KUBERNETES INTEGRATION

Trident, NetApp's dynamic persistent volume provisioner, uses AWS or Azure storage through Cloud Volumes ONTAP to meet Kubernetes containerized workloads persistent storage demands.

Cloud Volumes ONTAP
Key Benefits

1 CONTINUOUS PERFORMANCE

High availability with no data loss, quick failover, short recovery times, and non-disruptive upgrade (NDU) processes.

2 SIMPLE CLOUD ONBOARDING

with powerful data replication capabilities.

3 LOWERED COSTS

with data footprints reduced by as much as 70%.

4 HYBRID CLOUD & MULTICLOUD
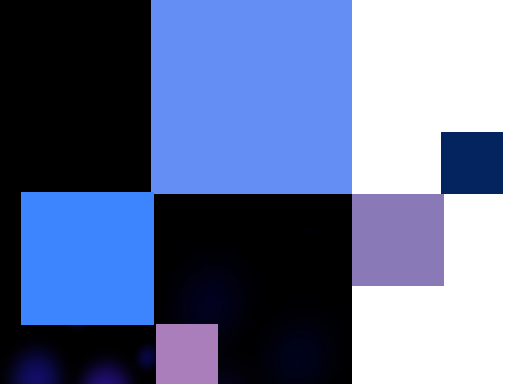
Easy data mobility and synchronization with the NetApp data fabric vision.

5 INCREASED AGILITY AND FASTER DEPLOYMENTS (TTM)

with seamless DevOps workflows.

Start a free trail of Cloud Volumes ONTAP to take your Moodle deployment to the next level.

Refer to the Interoperability Matrix Tool (IMT) on the NetApp Support site to validate that the exact product and feature versions described in this document are supported for your specific
environment. The NetApp IMT defines the product components and versions that can be used to construct configurations that are supported by NetApp. Specific results depend on each customer's
installation in accordance with published specifications.