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Revision history

Table 1 DD VE 4.0 in AWS Installation and Administration Guide revision history

<table>
<thead>
<tr>
<th>Revision</th>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>02</td>
<td>March 2019</td>
<td>Editorial updates</td>
</tr>
<tr>
<td>01</td>
<td>December 2018</td>
<td>Initial Publication (with DD OS 6.2.0.5)</td>
</tr>
</tbody>
</table>
As part of an effort to improve its product lines, we periodically release revisions of its software and hardware. Therefore, some functions described in this document might not be supported by all versions of the software or hardware currently in use. The product release notes provide the most up-to-date information on product features.

**Purpose**
This manual describes how to install, configure, and administer Data Domain Virtual Edition (DD VE) systems.

**Audience**
This manual is intended for use by both system administrators and general users of Data Domain Virtual Edition.

**Related documentation**
The following publications and websites provide additional information:

- **Data Domain Operating System Release Notes**
- **Data Domain Operating System Initial Configuration Guide**
  This manual explains configuration steps that are common to hardware and virtual Data Domain systems.
- **Data Domain Operating System OS Command Reference Guide**
  This manual explains how to administer Data Domain systems from the command line.
- **Data Domain Operating System OS Administration Guide**
  This manual explains how to administer Data Domain systems with the System Manager graphical user interface.
- **Data Domain Boost for OpenStorage Administration Guide**
  This manual explains how to use the DD Boost protocol for data transfer between backup software and Data Domain systems.
  This website lists Avamar and NetWorker software support for DD VE.

**Where to get help**
We support, product, and licensing information can be obtained as follows:

**Product information**
For documentation, release notes, software updates, or information about products, go to Online Support at [https://support.emc.com](https://support.emc.com).

**Technical support**
For technical support of this release of DD VE, go to Online Support at [https://support.emc.com](https://support.emc.com).

**Your comments**
Your suggestions will help us continue to improve the accuracy, organization, and overall quality of the user publications. Send your opinions of this document to DPAD.Doc.Feedback@emc.com.
CHAPTER 1

Introduction to DD VE

This chapter includes the following topics:

- What is DD VE? ................................................................. 10
- DD VE capabilities ......................................................... 10
- DD VE cloud capabilities ............................................... 10
What is DD VE?

Data Domain Virtual Edition (DD VE) is a software-only protection storage appliance: a virtual deduplication appliance that provides data protection for entry, enterprise and service provider environments. Like any Data Domain system, DD VE is always paired with backup software.

DD VE runs the Data Domain Operating System (DD OS), and provides the DD OS command line interface (CLI) and the Data Domain System Manager graphical user interface (GUI) for performing all system operations.

DD VE maintains the core Data Domain features that differentiate it as the industry-leading protection storage. This includes high-speed, variable length deduplication for a 10 - 30x reduction in storage requirements, unparalleled data integrity to ensure reliable recovery, and seamless integration with leading backup and archiving applications.

DD VE also comes with DD Boost, which speeds backups by 50%, DD Encryption for enhanced security of data, and DD Replicator, which enables network efficient replication for faster time-to-DR readiness.

DD VE runs on two types of platforms, on premises or in the cloud. On premises, DD VE supports VMware, Hyper-V, KVM, and VxRail. In the cloud, DD VE also runs in the Amazon Web Services (AWS) (cloud and gov cloud), Azure (cloud and gov cloud), VMware Cloud on AWS cloud platforms, and Google Cloud Platform (GCP). For more information about the features and capabilities of Data Domain systems (both physical and virtual), see the Data Domain Operating System Administration Guide.

DD VE capabilities

Resource configurations depend on your DD VE configuration. For capabilities for cloud configurations within the admin guide for your specific cloud provider, see DD VE capabilities in the cloud providers.

Note

See AWS System Configuration requirements for specific AWS configurations.

Please see the DD OS Administration Guide, DD Boost OST Guide, DD Boost for Partner Integration Administration Guide for additional information about the supported protocols and features.

DD VE cloud capabilities

DD VE provides the capabilities of a cloud Data Domain system using the following resource configuration sizes.

Table 2 DD VE on AWS Resource Configuration Size

<table>
<thead>
<tr>
<th>Type</th>
<th>Resource Configuration Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>DD VE on Block Storage</td>
<td>up to 16 TB</td>
</tr>
<tr>
<td>DD VE on S3 Storage</td>
<td>up to 96 TB</td>
</tr>
</tbody>
</table>
The following sections list supported and unsupported Data Domain protocols and features in DD VE.

**Supported Data Domain protocols**

- DD Boost over IP
- DD Boost FS

**Supported Data Domain features**

- DD Boost managed file replication (MFR)
- Encryption
- MTree replication
- Data Domain System Manager GUI for DD VE management
- Secure multitenancy (SMT) with Network Isolation Support in 6.0
- DD Boost for Big Data
- Key Management Interoperability Protocol (KMIP)
- More restricted IPtables settings
- AWS for Government Cloud
- DD VE supports two types of data storage for AWS:
  - DD VE on S3 Storage
  - DD VE on Block Storage

---

**Note**

DD VE 4.0 supports these replication capabilities:

- Managed file replication and MTree replication
- Replication across availability zones and regions
- On-prem to cloud and converse replication
- Bidirectional replication between on-prem and AWS
- DD VE supports a maximum of six active MTrees at a given time, however up to 100 MTrees can be created on the DD VE

---

Please see the DD OS Administration Guide, DD Boost OST Guide, DD Boost for Partner Integration Administration Guide for additional information about the supported protocols and features above.
CHAPTER 2

Deploy the DD VE

- Deploying DD VE on AWS ................................................................. 14
Deploying DD VE on AWS

DD VE on S3 Storage provides a data protection solution that enables customers to protect their operational data in the cloud, to backup/restore the DD VE on S3 Storage data into cloud object store, while the DD VE is running in the cloud. This section describes first-time setup procedures, and includes how to manage and monitor the DD VE in an AWS environment.

Note
For DD VE on Block Storage see Configuring DD VE on block storage using the DD SM interface

DD VE supports
- AWS GovCloud Region
- AWS Standard Cloud

Note
The only difference in setting up an AWS GovCloud Region occurs when creating the policy bucket format, standard or FIPS endpoints may be used. For additional information, see Federal Information Processing Standard (FIPS) 140-2.

AWS System Configuration requirements

These are the system configuration requirements for configuring the AWS DD VE on S3 storage.

System Configuration Requirements for AWS Meta data disk type: GP2

Table 3 AWS System Requirements

<table>
<thead>
<tr>
<th>Instance type</th>
<th>M4.xlarge</th>
<th>M4.2xlarge</th>
<th>M4.4xlarge</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU</td>
<td>4</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>Memory (GiB)</td>
<td>16</td>
<td>32</td>
<td>64</td>
</tr>
<tr>
<td>System Disk</td>
<td>250 GiB GP2 Root disk</td>
<td>250 GiB GP2 Root disk</td>
<td>250 GiB GP2 Root disk</td>
</tr>
<tr>
<td>System Disk</td>
<td>10 GiB GP2 vNVRAM disk</td>
<td>10 GiB GP2 vNVRAM disk</td>
<td>10 GiB GP2 vNVRAM disk</td>
</tr>
<tr>
<td>Maximum File System Capacity</td>
<td>up to 16 TB</td>
<td>up to 32 TB</td>
<td>up to 96 TB</td>
</tr>
</tbody>
</table>

Table 4 AWS stream counts

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Memory</th>
<th>Number of 1 TiB metadata disks</th>
<th>Stream counts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Read</td>
</tr>
<tr>
<td>16 TB (M4.xlarge)</td>
<td>16 GB</td>
<td>1</td>
<td>12</td>
</tr>
</tbody>
</table>
### Table 4 AWS stream counts (continued)

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Memory</th>
<th>Number of 1 TiB metadata disks</th>
<th>Stream counts</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Read</td>
<td>Write</td>
<td>Replication in</td>
<td>Replication out</td>
<td>Combined</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>24</td>
<td>36</td>
<td>36</td>
<td>36</td>
</tr>
<tr>
<td>32 TB (M4.2xlarge)</td>
<td>32 GB</td>
<td>1</td>
<td>12</td>
<td>48</td>
<td>48</td>
<td>24</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>24</td>
<td>72</td>
<td>72</td>
<td>48</td>
<td>72</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 or more</td>
<td>40</td>
<td>72</td>
<td>72</td>
<td>72</td>
<td>72</td>
</tr>
<tr>
<td>96 TB (M4.4xlarge)</td>
<td>64 GB</td>
<td>1</td>
<td>12</td>
<td>48</td>
<td>48</td>
<td>24</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>24</td>
<td>96</td>
<td>96</td>
<td>48</td>
<td>96</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 or more</td>
<td>40</td>
<td>144</td>
<td>144</td>
<td>72</td>
<td>144</td>
</tr>
</tbody>
</table>

### AWS Storage Size Specifications

These are the system configuration requirements for configuring the DD VE on S3 Storage on AWS.

#### System Configuration Requirements for AWS Meta data disk type: GP2

#### Table 5 Storage Size Specifications

<table>
<thead>
<tr>
<th>Configuration (Max Capacity)</th>
<th>Instance Type</th>
<th>Block Storage Volumes</th>
<th>Object Storage Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Root Disk</td>
<td>vNVRAM Disk</td>
</tr>
<tr>
<td>16 TB</td>
<td>M4.xlarge</td>
<td>GP2/250GiB</td>
<td>GP2/10GiB</td>
</tr>
<tr>
<td>32 TB</td>
<td>M4.2xlarge</td>
<td>GP2/250GiB</td>
<td>GP2/10GiB</td>
</tr>
<tr>
<td>96 TB</td>
<td>M4.4xlarge</td>
<td>GP2/250GiB</td>
<td>GP2/10GiB</td>
</tr>
</tbody>
</table>

#### Note

The metadata requirements stated in the table above are based on 10X dedup ratio and 2X compression. Your system configuration may require a higher storage ratio. Please expand the storage if you receive an alert asking you to do so.

### Deploy the DD VE in AWS with Cloud Formation Template

- The DD VE on S3 Storage can be configured on AWS using Cloud Formation Template Deployment option.
- Refer to Network Setup Recommendations for subnet and security group settings.
- Create IAM role and key pair to attach to the instance during deployment.
Cloud Formation Template Deployment

Procedure

1. Go to AWS Marketplace. (For AWS GovCloud Region, use https://aws.amazon.com/mp/govcloud/)

2. Search for “Data Domain Virtual” in the search bar for “AMI and SaaS”.

3. “Choose Dell EMC Data Domain Virtual Edition (DD VE) v4.0” and click on “Continue to Subscribe”

4. Click on “Continue to Configuration”

5. Select the fulfillment option to launch a DD VE instance. “CloudFormation” is the recommended option. Select the “Region” in which to deploy the DD VE. Then click “Continue to Launch”

6. Review the configuration details, select “Launch the Cloud Formation” template, then click “Launch”.

7. The template URL is populated. Click “Next”.

8. The following values need to be populated in order to create the stack.

   - Stack name
   - DD VE Capacity: pick any capacity from the drop down list. The recommended amount of metadata storage and the instance type and will be attached automatically by the template, based on the selected capacity.
   - DD VE name tag
• IAM Role for S3 access: type in the correct IAM role to be attached to the DD VE
• Key pair: select an existing key pair from the drop down list
• Subnet ID
• Security Group ID

9. Proceed to create instance once the values are populated.
10. Once the stack creation is complete, verify the EC2 instance is running.

Configuring the DD VE on S3 Storage

This section provides best practices for the DD VE on S3 Storage configuration.

Before you begin
• Refer to the recommended network setup recommendations.
• Metadisks should be added in 1TiB increments. The recommended metadata storage is 10% of the total capacity.
• The bucket and IAM role need to created. Refer to bucket and role instructions.

The DD VE can be configured using one of the following options
• Graphical User Interface (GUI)
• Command Line Interface (CLI)

Note
The role must be attached to DD VE instance, before configuring object store feature in DD VE using its CLI or GUI.

After you finish
The following sections describe the steps to configure the DD VE using GUI or CLI.

Creating an S3 bucket

Create a bucket in S3 and make note of the bucket name. The bucket name will be used in the IAM policy template and also used to create the cloud profile on the DD VE.
Note

- The bucket should be created in the same region as the DD VE instance. The length of the bucket name should be no more than 48 characters.

- Do not enable S3 versioning for the bucket that is associated with the DD VE, for the following reasons.
  1. It will result in more storage usage and hence, increased storage costs. For example, even though DD VE’s Garbage Collection process deletes the objects that are not needed, those objects still consume storage.
  2. It may result in potential performance issues.

AWS role-based access for S3 object store access

Object store in AWS uses role-based access for S3 access. This section provides the steps to achieve this access by creating and attaching the IAM role to the DD VE. The DD VE then fetches the access credentials to access the S3 bucket. The access credentials are rotated periodically by the AWS infrastructure. The new credentials are automatically fetched by the DD VE just before the old credentials expire.

Before you begin

In order to create the IAM role and the policy associated with the role, the AWS user should have the necessary IAM privileges. The following are some of the IAM privileges/actions that are required to create and attach the IAM role.

```
"iam:AddRoleToInstanceProfile",
"iam:AttachRolePolicy",
"iam:CreateRole",
"iam:DeleteRole",
"iam:DeleteRolePolicy",
"iam:DetachRolePolicy",
"iam:GetRole",
"iam:GetRolePolicy",
"iam:ListRolePolicies",
"iam:ListRoles",
"iam:PassRole",
"iam:RemoveRoleFromInstanceProfile",
"iam:UpdateRolePolicy",
"iam:CreateInstanceProfile",
"iam:PutRolePolicy",
"iam:DeleteInstanceProfile"
```

Once you have the necessary privileges as an AWS, continue creating the role-based for S3 object store access as follows.
Create the policy for S3 bucket access

**Procedure**

1. Sign in to the AWS Management Console and open the IAM Service Console.
2. In the navigation pane of the IAM console, choose “Policies” and then click “Create policy” button.
3. In the “Create policy” web page, select the tab “JSON”
   a. Replace the text under the JSON tab with the following content.

```
Note

- Substitute “my-bucket-name” with the name of the bucket that you have created for the DD VE.
- For AWS standard cloud, use “arn:aws:s3:::my-bucket-name”

```\[
{ "Version": "2012-10-17", "Statement": [ 
```

- Substitute “my-bucket-name” with the name of the bucket that you have created for the DD VE.
- For AWS GovCloud Region use “arn:aws-us-gov:s3:::my-bucket-name”

```
{ "Version": "2012-10-17", "Statement": [ 
```

b. Verify this information on your screen then click the “Review policy” button.
c. Provide the name and description of your choice.

Create policy

Review policy

Name: * S3-access-policy
Use alphanumeric and - _ characters. Maximum 128 characters.

Description: The policy defines the actions that are permitted by DD VE on the given resource. i.e. an S3 bucket in this context.

Summary

<table>
<thead>
<tr>
<th>Service</th>
<th>Access level</th>
<th>Resource</th>
<th>Request condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>S3</td>
<td>Limited: List, Read, Write</td>
<td>Multiple</td>
<td>None</td>
</tr>
</tbody>
</table>

* Required

1. In the navigation pane of the IAM console, choose “Roles” and then click the “Create role” button.
2. On the “Create role” page,
   a. For the “Select type of trusted entity” option, select “AWS service”
   b. For the “Choose the service that will use this role” option, select “EC2”
   c. Then click “Next Permissions” to advance to the next section.
3. On the “Attach permissions policies” page, search for the policy that you created in the previous section, such as “ddve-s3-access-policy”. Then select the check box for that policy. Click the “Next review” button to advance to the next section.

d. Follow the steps in the next section to create the role and attach the policy you have just created to the role.

Create the role for S3 bucket access

Procedure

1. In the navigation pane of the IAM console, choose “Roles” and then click the “Create role” button.
2. On the “Create role” page,
   a. For the “Select type of trusted entity” option, select “AWS service”
   b. For the “Choose the service that will use this role” option, select “EC2”
   c. Then click “Next Permissions” to advance to the next section.
3. On the “Attach permissions policies” page, search for the policy that you created in the previous section, such as “ddve-s3-access-policy”. Then select the check box for that policy. Click the “Next review” button to advance to the next section.
4. For the “Review” section, provide the name for the role. then click the “Create role” button.

5. Select the role you created during the DD VE deployment or attach the role after the DD VE is deployed.
Configuring DD VE using the Data Domain System Manager interface

DD VE can be configured in AWS using the following.

Before you begin

- Recommended metadata storage is 10% of the total capacity.
- The default sysadmin password is the instance-id.
- DHCP is enabled on the DD VE system by default. If the DHCP service is available, the DD VE system will receive IP addresses from the DHCP server. After the before you begin section, add the following note.
- To configure DD VE on Block Storage, refer to Configuring DD VE on block storage using the DDSM interface.

Note

Dynamic Host Configuration Protocol (DHCP) is only activated automatically for the first network interface card (NIC) which is built into the virtual machine template. Any extra NICs must be configured manually by following instructions here for elastic network interfaces: https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/using-eni.html

Configuring DD VE using the DD SM interface (http/https)

The GUI configuration wizard helps go through the DD VE on S3 Storage configuration and file system creation on DD.

Procedure

1. Log in to the Data Domain System Manager by entering the IP address of the DD VE into the web browser.
2. For the “Apply your license” step, select one of the three license types available on the drop down menu:
   - Pre-install Evaluation: (500GB)
   - License File: Node locked license (unserved mode)
   - License Server: Served mode license

   Note

   If you begin the configuration with the evaluation license, but wish to purchase a license later, you will need the Node Locking ID for the DD VE instance. Click Administration > Licenses to view the Node Locking ID.

3. Then click “Apply” Accept the End User License Agreement (EULA) by clicking “I accept the terms of EULA”.
4. Next, the “Configuration Wizard” will guide you through the DD VE on S3 Storage configuration and file system creation on the DD VE. The GUI Configuration Wizard contains six sections: Networking, File System, System Settings, DD Boost, CIFS, and NFS. Select “File System” and click “Yes”.
5. Select “Configure Active Tier”. Then, select “Enable Object Store” checkbox to configure the DD VE on S3 Storage system.

6. Enter the passphrase. **(Be sure to make note of this passphrase, you will need it again later.)** Enter the S3 bucket name created in the same region as the DD VE instance. Refer to the bucket and role creation instructions.

---

**Note**

At this point, for AWS GovCloud there will be an option for the FIPS endpoint to be enabled.

---

7. Import the Baltimore CyberTrust Root certificate to communicate with AWS S3 Object Store.

8. Add the metadata storage.

9. Review the summary and Click “Submit” to create the file system and enable it.

11. The File System section under the Data Management tab has the space usage and availability details for the S3 Object storage as well as the local metadata storage.

   
a. For system settings: update the sysadmin password. optionally configure alert and autosupport email settings.

b. For DD Boost: Create a Boost storage unit and assign a user ID to own it.

13. To configure or update the elicense on the DD VE, click “Replace licenses” button in the Licenses page as shown in this image.
14. To relaunch the configuration wizard, select “System” under “Maintenance”, then “Configure System”

**After you finish**

**Note**

Set up NTP time synchronization by following the steps in Setting up NTP Time Synchronization in AWS.

---

**Configuring DD VE using the Command Line Interface**

DD VE can be configured using the CLI option.

**Before you begin**

- Recommended Metadata storage is 10% of the total capacity.
- The default sysadmin password for DD VE in AWS is the instance id.
- Dynamic Host Configuration Protocol (DHCP) is enabled on the DD VE system by default. If the DHCP service is available, the DD VE system will receive IP addresses from the DHCP server.

**Note**

DHCP is only activated automatically for the first network interface card (NIC) which is built into the virtual machine template. Any extra NICs must be configured manually by following instructions here for Elastic Network Interfaces: https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/using-eni.html.

---

**Configuring the DD VE using the CLI**

**Procedure**

1. Log in to the DD VE instance via SSH using the sysadmin account and password and instance-id. Or you may use SSH using key-pair.

   - When logging in for the first time, you will be asked to change the password. Enter the new password. The initial configuration wizard will start.
   - In this section, we will be using CLI commands for all the configuration steps. Press Enter for all options to exit the wizard and proceed with the CLI commands.

   ```bash
   $ ssh -l sysadmin <DDVE ip address>
   The authenticity of host '***.***.*** (***.***.***.*) can't be established.
   ECDSA key fingerprint is SHA256:evoXXGRgCzp/tmrtWRIAeOWLpI7ymOg9m7TwBw9J2bs.
   Are you sure you want to continue connecting (yes/no)? yes
   Warning: Permanently added '**.**.**.**' (ECDSA) to the list of
   ```
known hosts.
EMC Data Domain Virtual Edition
Password: Password:
Welcome to Data Domain OS *****
----------------------------------
Press any key then hit enter to acknowledge the receipt of EULA information:
Press any key then hit enter to acknowledge the receipt of EULA information: q
Do you want to configure system using GUI wizard (yes|no) [no]:

Network Configuration
Configure Network at this time (yes|no) [no]:

eLicenses Configuration
Configure eLicenses at this time (yes|no) [no]:

System Configuration
Configure System at this time (yes|no) [no]:

Storage object-store profile Configuration
Configure Storage object-store profile at this time (yes|no) [no]:

Configuration complete.

2. To update the eLicense on DD VE, copy license file to /ddvar and use the file name as follows: # elicense update <filename.lic>.

```
# elicense update atos_cap_96_TB.lic
```

Existing licenses:

<table>
<thead>
<tr>
<th>Capacity licenses:</th>
<th>Feature</th>
<th>Capacity</th>
<th>Type</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>1   CAPACITY</td>
<td>0.45 TiB</td>
<td>unexpired</td>
<td>active n/a</td>
<td></td>
</tr>
</tbody>
</table>

Feature licenses:

<table>
<thead>
<tr>
<th>Feature licenses:</th>
<th>Feature</th>
<th>Count</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1   REPLICATION</td>
<td>active n/a</td>
<td>1</td>
<td>unexpired evaluation</td>
</tr>
<tr>
<td>2   DDBOOST</td>
<td>active n/a</td>
<td>1</td>
<td>unexpired evaluation</td>
</tr>
<tr>
<td>3   RETENTION-LOCK-GOVERNANCE</td>
<td>active n/a</td>
<td>1</td>
<td>unexpired evaluation</td>
</tr>
<tr>
<td>4   ENCRYPTION</td>
<td>active n/a</td>
<td>1</td>
<td>unexpired evaluation</td>
</tr>
</tbody>
</table>

New licenses:

<table>
<thead>
<tr>
<th>Capacity licenses:</th>
<th>Feature</th>
<th>Capacity</th>
<th>Type</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>1   CAPACITY</td>
<td>87.31 TiB</td>
<td>permanent (int)</td>
<td>active n/a</td>
<td></td>
</tr>
</tbody>
</table>

Deploy the DD VE

Data Domain Virtual Edition in Amazon Web Services (AWS) DD VE 4.0 with DD OS 6.2.0.10 Installation and Administration Guide
Feature licenses:
#
## Feature   Count   Type              State
Expiration Date   Note
--   ------   --------------------   ------
---------------   ----
1  DDBOOST          1   permanent (int)   active   n/a
2  ENCRYPTION       1   permanent (int)   active   n/a
3  REPLICATION       1   permanent (int)   active   n/a
--   ------   --------------------   ------
---------------   ----
** New license(s) will overwrite all existing license(s).
Do you want to proceed? (yes|no) [yes]: yes

Use the # elicense show command to verify.

# elicense show
System locking-id: V4MXYV1S7R6VZVRW6T9JTMPPBZEGY4CL25FSPX775WJC8GM6F57YKTD
HGTFDGR9AJ2Y66CSH152YJRS6FUFUZ2FP6VAATMY2FWMSSKZ8SHD
System software-id: Not available
Instance software-id: Not available
Licensing scheme: EMC Electronic License Management System (ELMS) node-locked mode
Capacity licenses:
#
## Feature    Capacity    Type              State
Expiration Date   Note
--   --------   ---------   --------------------   ------
---------------   ----
1  CAPACITY  87.31 TiB   permanent (int)   active   n/a
--   --------   ---------   --------------------   ----
---------------   ----
License file last modified at : 2018/05/07 18:56:36.

3. Enable object store with # storage object-store enable

# storage object-store enable
Object-store is enabled.

4. Create the object store profile
   a. System Passphrase is required to encrypt the object store credentials. It will also will be used to encrypt keys if file system encryption is enabled. If the passphrase has already been set, user will not be prompted to enter passphrase.

   b. For AWS, the Baltimore CyberTrust Root certificate is needed to communicate with object store and should be imported for the profile creation to succeed.
c. For AWS GovCloud, profile creation will have an option for selecting the FIPS endpoint with an option for the FIPS endpoint to be enabled.

```
# storage object-store profile set
A passphrase needs to be set on the system.
Enter new passphrase: <enter-passphrase-string-meeting-requirements>
Re-enter new passphrase: <re-enter-passphrase-string>
Passphrases matched.
The passphrase is set.
DD VE is running in AWS. Role-based access will be used to access s3.
Enter the bucket name: <name-of-the-bucket>
Object-store endpoint needs the Baltimore CyberTrust Root certificate to be imported.
Do you want to import that certificate with below fingerprint?

Profile is set.
```

5. Add the storage using

```
# storage add tier active dev3
# storage add tier active dev3

Checking storage requirements...done
Adding dev4 to the active tier...done
Updating system information...done
dev4 successfully added to the active tier.

Multiple devices can also be added as metadata storage using the following CLI command. This will be useful in when adding dev4, dev5, and dev6 to the DD VE:

```
# storage add tier active dev4-6
# storage add tier active dev4-6

Checking storage requirements...done
Adding dev4 to the active tier...done
Updating system information...done
dev4 successfully added to the active tier.

Checking storage requirements... done
Adding dev5 to the active tier...done
Updating system information...done
dev5 successfully added to the active tier.

Checking storage requirements... done
Adding dev6 to the active tier...done
```
Updating system information...done
dev6 successfully added to the active tier.

Note

Use the command below to see the disks that are attached.

# storage show all
# storage show all
Active tier details:
<table>
<thead>
<tr>
<th>Device</th>
<th>Device</th>
<th>Device</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>Size</td>
<td>Size</td>
</tr>
<tr>
<td>------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>(available) 3</td>
<td></td>
<td>500.0 GiB</td>
</tr>
<tr>
<td>(available) 5</td>
<td></td>
<td>200.0 GiB</td>
</tr>
</tbody>
</table>

Spindle     Devices   Count   Total Size
<table>
<thead>
<tr>
<th>Group</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1      5</td>
<td>1</td>
<td>200.0 GiB</td>
<td></td>
</tr>
<tr>
<td>3      3</td>
<td>1</td>
<td>500.0 GiB</td>
<td></td>
</tr>
</tbody>
</table>

Active tier maximum capacity: 0.5 TiB

Storage addable devices:
<table>
<thead>
<tr>
<th>Device</th>
<th>Device</th>
<th>Device</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Size</td>
<td>Size</td>
</tr>
<tr>
<td>-------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>(unknown) 4</td>
<td></td>
<td>100.0 GiB</td>
</tr>
</tbody>
</table>

6. Create the file system

# filesys create
# filesys create
A filesystem of approximate size 2.71 TiB will be created.
Do you want to continue? (yes|no) [yes]: yes
ok, continuing.
This will take 5 - 10 minutes.
Provisioning storage...
================================================================================ [100%]

Initializing filesystem...
================================================================================ [100%]
snapshot schedules deleted
You now have a freshly initialized filesystem.
Enable the filesystem using 'filesys enable'.

7. Enable file system

# filesys enable
sysadmin@ip-10-22-2-217# filesys enable
Please wait..........................
The filesystem is now enabled.
sysadmin@ip-10-22-2-217# filesys status
The filesystem is now enabled and running.
After you finish

Note

Set up NTP time synchronization by following the steps in Setting up NTP Time Synchronization in AWS.

System Headswap

This section describes how the system headswap command recovers DD VE with head unit failure in AWS.

To perform system headswap, vNVRAM disk and Metadata disks from system A (original system) should be available, and they will be attached to the new instance B. If either vNVRAM disk or any metadata disk is not available, the command “system recovery from object-store” should be used instead.

Procedure

1. Create instance B with Head Unit (root disk only) with the same instance type as the original one.

2. Detach the vNVRAM and Meta-data storage from the broken head unit.

3. Attach the vNVRAM and Meta-data storage above to instance B Head Unit.

   Note

   Make sure that the vNVRAM disk is attached before attaching the metadata disks.

4. Set system passphrase

   Note

   Please set the passphrase to match with system A, otherwise, headswap will fail to proceed.

   ```
   # system passphrase set
   Enter new passphrase:
   Re-enter new passphrase:
   Passphrases matched.
   The passphrase is set.
   ```

5. Note

   Before executing the headswap command, please make sure that the system A is powered off. This step is required to detach the bucket from system A and make it available to be attached with system B.

   Execute system headswap

   Note

   System will reboot during the headswap process

   ```
   # system headswap
   This command returns the system back to its prior operational conditions. The system will be rebooted before resuming normal operations.
   ```
** If system passphrase was set on the old head, you will need to do one of the following after headswap completes:
- unlock the filesystem          if you have encrypted data, or
- set the system passphrase      if you don't have encrypted data
Are you sure? (yes|no) [no]: yes
ok, proceeding.

Please enter sysadmin password to confirm 'system headswap':
Restoring the system configuration, do not power off / interrupt process ...
Broadcast message from root (Mon Apr 30 13:44:10 2018):
The system is going down for reboot NOW!

6. Check filesys status after the headswap process is complete.

   # filesys status
   The filesystem is enabled and running.

System Recovery

This section describes how the system recovery command recovers DD VE with head unit, vNVRAM disk, Metadata disk, on failure.

Before you begin

The system recovery command recovers DD VE with head unit, vNVRAM disk, metadata disk failure, or any combination of the three. However, if both vNVRAM disk and Metadata disks are available, then the system headswap command should be used instead.

Procedure

1. Create instance B with the same configuration as instance A, including instance type, metadata disk capacity.

2. Enable object-store

   # storage object-store enable
   Object-store is enabled.

3. Set object-store profile

   a. Set the passphrase to match with system A, otherwise, the recovery will fail to proceed.

   b. Set the same s3 bucket name from system A.

      # storage object-store profile set
      A passphrase needs to be set on the system.
      Enter new passphrase: <enter-passphrase-string-meeting-requirements>
      Re-enter new passphrase: <re-enter-passphrase-string>
      Passphrases matched.
      The passphrase is set
      DD VE is running in AWS. Role-based access will be used to access s3.
      Enter the bucket name: <name-of-the-bucket>
      Object-store endpoint needs the Baltimore CyberTrust Root certificate to be imported.
      Do you want to import that certificate with below fingerprint?
Profile is set.
# storage object-store profile set

c. Follow rest of CLI prompts.

4. Add EBS volumes to the active tier

Note
Add EBS volumes to match or exceed the capacity of system A.

# storage add dev3
Object-store is not enabled. Filesystem will use block storage for user data.
    Do you want to continue? (yes|no) [no]: yes
Checking storage requirements...done
Adding dev3 to the active tier...done
Updating system information...done
dev3 successfully added to the active tier.

5. Run system recovery precheck

# system recovery precheck from object-store
Recovery precheck passed. Use start command to start the recovery.

6. Execute the recovery

# system recovery start from object-store
System recovery has started. Use status command to check the status.

7. Check the status with recovery status

# system recovery status
System recovery is running: stage 2 of 6 (attaching object-store)

Note
The system will reboot during the recovery process.

8. Check filesys status after the recovery process completed.

# filesys status
The filesystem is enabled and running.

Capacity Expansion in AWS
If the higher capacity is supported by the current DD VE configuration, follow these steps to upgrade the DD VE to a higher capacity.

Procedure
1. Add the needed data disks (DD VE on block storage) or metadata disks (DD VE on S3 storage) for the new capacity.
2. Configure the newly added data disks using the CLI command storage add tier active dev<device id> (Or, use the DD SM GUI).
3. Expand the file system using the CLI command filesys expand. If the higher capacity is not supported by the VM size configuration of the current DD VE,
you must upgrade to a larger instance type from the current VM size to a higher VM size. (See Storage Size Specifications for AWS.)
Deploy the DD VE
CHAPTER 3

DD VE Administration

This chapter covers the following topics:

- Configure the System for Data Access ............................................................. 36
- DD VE Licensing.................................................................................................36
- Adding virtual storage .......................................................................................38
- Optional Additional System Configuration .........................................................39
- Extensions to DD OS for DD VE.......................................................................39
- DD VE-only commands.......................................................................................40
- System Recovery CLI.........................................................................................41
- Modified DD OS commands............................................................................44
- Performance Troubleshooting ..........................................................................46
- Unsupported DD OS Commands .......................................................................47
- Upgrade DD OS..................................................................................................52
- Define the Data Domain System Information for Your Site ...............................52
- Setting Up NTP Time Synchronization ..............................................................54
- Configuration of optional software and internal licenses.................................54
Configure the System for Data Access

The DD VE system provides the DD Boost protocol. You need to configure one or more protocols for data access, depending on your environment. You also need to configure the clients for accessing the DD VE with the protocol of your choice.

If you did not configure data access with the configuration wizard, use the instructions in this section.

**DD Boost (DD VE includes the DD Boost for cloud or on premises)**

For setting up the Data Domain DD Boost feature, see the *Data Domain Boost for OpenStorage Administration Guide* or *Data Domain Boost for Partner Integration Administration Guide* available at [https://support.emc.com](https://support.emc.com).

**Application Integration**

For information about how to integrate the Data Domain system with backup software, see the documentation for the applicable application at the Data Domain Integration Documentation section on the Data Domain Support web site [https://support.emc.com](https://support.emc.com).

**DD VE Licensing**

DD VE licensing may be via
- Served Licensing
- File based license

Licensing for DD VE is based on capacity, with the minimum purchased capacity being 1 TB and going up in 1 TB increments. There are no differences in the available features and functionality between any of the available resource configurations.

**DD VE Served Licensing**

DD VE 4.0 features the Served Licensing Model for DD VE which provides the solution for managing licensing for the deployment of DD VE(s). This licensing model is useful if you have multiple DD VE instances in your environment. This solution is only available for virtual systems, not physical systems at this time. The sales ordering process will remain the same. Licenses are retrieved, by the customer, from the Software Licensing Central (SLC) portal. This allows you to deploy the license server software (the hardware server is not provided) by downloading this license, loading it into the license server, and configuring the DD VE to talk to the license server. Refer to the applicable *Data Domain Operating System Release Notes* for the most up-to-date information on product features, software updates, software compatibility guides, and information about products, licensing, and service.

**Note**

When you obtain the original license file name the server, do not enter the comma in the license file name. DD OS will not accept the name if the comma is used. Please save the filename with a hyphen or underscore instead of a comma.

*Figure 1* on page 37 shows a sample email generated by the Software Licensing Central portal system. [https://support.emc.com/servicecenter/license/](https://support.emc.com/servicecenter/license/) provides additional information about software licensing. If you cannot find your License Authorization e-mail, contact your account representative or support.
DD VE Administration

- Up to 16 TB
- Up to 32 TB
- Up to 96 TB

The DD VE is locked until a license, either the evaluation license or a purchased license, is activated.

After the DD VE is configured and running, the `elicense reset`, `elicense show`, and `elicense update` commands provide the ability to manage the DD VE license.

DD VE contains the following Data Domain feature licenses:

- DDVE_CAPACITY
- DDVE_DDBOOST
- DDVE_ENCRYPTION
- DDVE_REPLICATION

**Note**

Mtrees replication and managed file replication are the only supported forms of replication in DD VE.

- CLOUDTIER_CAPACITY

**File based license**

DD VE is licensed through the Software Licensing Central portal. When you purchase DD VE, you receive an email which email contains a license authorization code (LAC) to redeem for the DD VE software license. Follow the instructions in the email to create the license for the DD VE instance.

**Figure 1** Sample LAC email

---

How to configure: the served licensing model

**Table 6** Existing license server information on license server supported platforms

<table>
<thead>
<tr>
<th>Environment</th>
<th>System</th>
</tr>
</thead>
<tbody>
<tr>
<td>vCloud</td>
<td>Linux</td>
</tr>
<tr>
<td>AWS</td>
<td>Linux</td>
</tr>
<tr>
<td></td>
<td>Windows</td>
</tr>
</tbody>
</table>
The CLIs elicense checkout and elicense checkin are used to obtain licenses from the DD VE.

- If you experience an "invalid key magic" issue after a headswap, set the passphrase on the new DD VE, then perform the headswap `ddboost user revoke token-access sysadmin`.
- If DD VE was attached to an AV-server and you experienced a certificate authentication issue after a headswap, detach and re-attach the DD from the AV-server. The AV-server will then regenerate the certificate and import it to DD.

**Adding virtual storage**

Additional virtual storage can be added using the GUI or the CLI.

**Note**

It is not possible to extend a virtual disk if it has already been used by the file system. Instead, expand the storage by adding a new virtual disk.

**Using the GUI**

In DD SM, click **Hardware > Storage > Configure Storage** to add additional devices to the DD VE active tier.

**Note**

If no addable devices exist, create new virtual disks as described in **Capacity Expansion in AWS** on page 32.

**Using the CLI**

**Disk (Spindle Group) Configuration**

DD VE 3.1 and above, support 16 spindle-groups. We recommend that virtual disks from the same storage be configured with same spindle-group number. Virtual disks with different storage should be configured with a different spindle-group number. By default, disks are assigned with different spindle-groups. The best practice is NOT to assign spindle-group manually.

**Note**

The `storage add` command does not support multiple devices in one command line. As a workaround you may:

- Use

  ```
  # storage add dev3,dev4,dev5
  ```
  
or

- Use

  ```
  # storage add dev3-5
  ```
Optional Additional System Configuration

See the Data Domain Operating System Initial Configuration Guide for help performing typical but optional initial system configuration tasks. Below is a summary of the DD OS CLI commands for some common tasks.

Note

Any system command that accepts a list, such as a list of IP addresses, accepts entries separated by either commas or spaces. See the Data Domain Operating System Command Reference Guide for command details.

Add users to the email list that reports system problems:

```
# alerts notify-list add group-name
```

Add users to the system report email list:

```
# autosupport add {alert-summary|asup-detailed} emails email-list
```

Enable FTP or TELNET:

```
# adminaccess enable {ftp|telnet}
```

Add remote hosts to use FTP:

```
# adminaccess ftp add <host list>
```

Add a user:

```
# user add name [role {admin|user}]
```

Change a user’s password:

```
# user change password username
```

To enable remote management, refer to the Data Domain Operating System Administration Guide for details.

To Shut Down The System:

```
# system poweroff
```

Extensions to DD OS for DD VE

Several DD OS commands are supported on the DD VE platform only. This section describes these commands.

**perf**

Collect and show DD VE performance statistics.

```
perf disable trace event-regexp [module {default | ddfs}]
```

Disable tracing of specified events.

```
perf enable trace event-regexp [module {default | ddfs}]
```

Enable tracing of the specified events.

```
perf start histogram [module {default | ddfs}]
```

Start collecting performance histograms. This command may reduce performance marginally.

```
perf start stats
```

Start printing statistics. This command may reduce performance marginally.
perf start trace [allow-wrap] [module {default | ddfs}]
Start tracing events. This command may reduce performance marginally.

perf status trace event-regexp [module {default | ddfs}]
Shows whether tracing is enabled or disabled for the specified events.

perf stop histogram histogram-filename [module {default | ddfs}]
Stop collecting histograms and write the collected histograms to the specified file.

perf stop stats
Stop printing statistics.

perf stop trace trace-filename [module {default | ddfs}]
Stop tracing events and write the collected traces to the specified file.

system vresource
Display details about the virtual CPU and memory resources on the DD VE.
system vresource show [current | requirements]

```
# system vresource show requirements

<table>
<thead>
<tr>
<th>Active Tier</th>
<th>Cloud</th>
<th>Instance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity (TB)</td>
<td>Capacity (TB)</td>
<td>Type</td>
</tr>
<tr>
<td>--------------</td>
<td>---------------</td>
<td>--------</td>
</tr>
<tr>
<td>16</td>
<td>n/a</td>
<td>custom-4-16384 (Only block storage is supported)</td>
</tr>
<tr>
<td>16</td>
<td>n/a</td>
<td>custom-4-16384</td>
</tr>
<tr>
<td>32</td>
<td>n/a</td>
<td>custom-8-32768</td>
</tr>
<tr>
<td>96</td>
<td>n/a</td>
<td>custom-16-65536</td>
</tr>
</tbody>
</table>

** The maximum allowed system capacity for active tier on block storage is 16 TB
```

### DD VE-only commands

The following commands only work on DD VE, cloud provider systems.

**Table 7 DD VE-only commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>elicense checkout feature-license &lt;feature-name-list&gt;</td>
<td>Allows user to check out the features of licenses for License Server installation</td>
</tr>
<tr>
<td>elicense checkout capacity-license &lt;feature-name&gt; value &lt;n&gt; [TB</td>
<td>GB]</td>
</tr>
</tbody>
</table>
Table 7 DD VE-only commands (continued)

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>feature licenses. An addition 10 TB CAPACITY license will be checked out. 10 TB additional CAPACITY license has been checked out. License(s) have been checked out for REPLICATION, DDBOOST, ENCRYPTION. Total 10 TB CAPACITY license is now available on this system.</td>
<td>elicense checkin {&lt;feature-name-list&gt;</td>
</tr>
<tr>
<td>__(elicense license-server set server {&lt;ipaddr&gt;</td>
<td>&lt;hostname&gt;} port &lt;port-number&gt;)__</td>
</tr>
<tr>
<td>elicense license-server reset</td>
<td>elicense license-server show</td>
</tr>
<tr>
<td>filesystems</td>
<td>Shows space tier active local-metadata: Displays the usage for the metadata storage.</td>
</tr>
<tr>
<td>storage object-store enable</td>
<td>Enables the object-store feature for DD VE.</td>
</tr>
<tr>
<td>storage object-store disable</td>
<td>Disables the object-store feature for DD VE.</td>
</tr>
<tr>
<td>storage object-store profile set</td>
<td>Configures the object-store access profile.</td>
</tr>
<tr>
<td>storage object-store profile show</td>
<td>Displays the object-store access profile.</td>
</tr>
<tr>
<td>storage object-store profile status</td>
<td>Lists the object-store profile information set on the DD VE.</td>
</tr>
<tr>
<td>system vresource show [requirements]</td>
<td>Displays the file system capacity, the number of virtual CPUs, and the amount of memory assigned to the virtual machine running the DD VE instance. The requirements option displays the physical storage requirements for DD VE.</td>
</tr>
<tr>
<td>storage object-store disable</td>
<td>Enables the object-store feature for DD VE.</td>
</tr>
</tbody>
</table>

System Recovery CLI

The following system recovery commands are only applicable for the DD VE platform running on object store. These CLIs include:

1. system recovery precheck from object-store
2. system recovery start from object-store
3. system recovery status
## Table 8 Object Store Command Descriptions

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>system recovery precheck from object-store</td>
<td>This command checks if system configuration satisfies the requirement of system recovery. The same check will also be run for command system recovery start from object-store.</td>
</tr>
<tr>
<td></td>
<td>- system recovery precheck from object-store Role required: admin # system recovery precheck from object-store Recovery precheck passed. Use start command to start the recovery.</td>
</tr>
<tr>
<td></td>
<td>- Failure Cases</td>
</tr>
<tr>
<td></td>
<td>- Object-store is not enabled. # system recovery precheck from object-store **** Cannot run precheck: object-store is not enabled.</td>
</tr>
<tr>
<td></td>
<td>- Profile is not configured # system recovery precheck from object-store **** Cannot run precheck: object-store profile is not configured.</td>
</tr>
<tr>
<td></td>
<td>- Object store is not configured # system recovery precheck from object-store **** Cannot run precheck: object-store is not configured.</td>
</tr>
<tr>
<td></td>
<td>- Platform configuration doesn't match the original. # system recovery precheck from object-store Precheck found the following issues:</td>
</tr>
<tr>
<td></td>
<td>1. DD VE version version does not match the original version version</td>
</tr>
<tr>
<td></td>
<td>2. Instance type instance does not match the original instance type instance</td>
</tr>
<tr>
<td></td>
<td>3. Passphrase does not match the original passphrase</td>
</tr>
<tr>
<td></td>
<td>4. Active tier capacity $n$ GiB is smaller than the original capacity $m$ GiB</td>
</tr>
<tr>
<td></td>
<td>5. The object-store name does not have valid filesystem data</td>
</tr>
<tr>
<td></td>
<td>6. The filesystem already exists</td>
</tr>
<tr>
<td></td>
<td>7. The system recovery is already in progress</td>
</tr>
<tr>
<td>system recovery start from object-store</td>
<td>This command starts system recovery from object-store. Since precheck is run again before recovery is actually started, all failure cases for system recovery start from object-store also apply for this command.</td>
</tr>
<tr>
<td></td>
<td>- system recovery start from object-store Role required: admin # system recovery start from object-store System recovery has started. Use status command to check the status.</td>
</tr>
<tr>
<td></td>
<td>- Failure cases # system recovery start from object-store Precheck found the following issues:</td>
</tr>
</tbody>
</table>
### Table 8 Object Store Command Descriptions (continued)

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. DD VE version version does not match the original version version</td>
<td></td>
</tr>
<tr>
<td>2. Instance type instance does not match the original instance type instance</td>
<td></td>
</tr>
<tr>
<td>3. Passphrase does not match the original passphrase</td>
<td></td>
</tr>
<tr>
<td>4. Active tier capacity $n$ GiB is smaller than the original capacity $m$ GiB</td>
<td></td>
</tr>
<tr>
<td>5. The object-store name does not have valid filesystem data</td>
<td></td>
</tr>
<tr>
<td>6. The filesystem already exists</td>
<td></td>
</tr>
<tr>
<td>7. The system recovery is already in progress**** Failed to start system recovery.</td>
<td></td>
</tr>
<tr>
<td>System recovery status</td>
<td>This command shows the current system recovery status.</td>
</tr>
</tbody>
</table>

- **system recovery status**

  ```
  Role required: anyone
  # system recovery status
  System recovery is running: stage x of 6 {<stage name>}. where <stage name> := [ starting attaching object-store | formatting active tier | restoring configurations | rebooting system | restoring filesystem | ]
  ```

  - **Cases**
    - Recovery has never run
      ```
      # system recovery status
      System recovery has never run.
      ```
    - Recovery has completed
      ```
      # system recovery status
      System recovery completed on <date time>. where <date time> format is, for example, "Tue Feb 1 15:37:32 2018".
      ```
    - Fail to create volume
      ```
      **** # system recovery status
      System recovery did not complete: failed to format active tier.
      ```
    - Fail to restore configurations
      ```
      **** # system recovery status
      System recovery did not complete: failed to restore system configurations from object-store.
      ```
    - Fail to restore filesystem
      ```
      **** # system recovery status
      System recovery did not complete: failed to restore the filesystem.
      ```
Modified DD OS commands

The behavior of the following commands has been modified on the DD VE platform:

<table>
<thead>
<tr>
<th>Command</th>
<th>Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>alert</td>
<td>The tenant-unit parameter is not supported.</td>
</tr>
<tr>
<td>compression</td>
<td>The tenant-unit parameter is not supported.</td>
</tr>
<tr>
<td>config setup show</td>
<td>Arguments for configuring features not available in DD VE have been removed.</td>
</tr>
<tr>
<td>ddboot clients show active</td>
<td>The tenant-unit parameter is not supported.</td>
</tr>
<tr>
<td>ddboot file-replication show active</td>
<td>The tenant-unit parameter is not supported.</td>
</tr>
<tr>
<td>ddboot file-replication show detailed-file-history</td>
<td>The tenant-unit parameter is not supported.</td>
</tr>
<tr>
<td>ddboot file-replication show file-history</td>
<td>The tenant-unit parameter is not supported.</td>
</tr>
<tr>
<td>ddboot option reset</td>
<td>The fc parameter is not supported.</td>
</tr>
<tr>
<td>ddboot option show</td>
<td>The fc parameter is not supported.</td>
</tr>
<tr>
<td>ddboot storage-unit create</td>
<td>The tenant-unit parameter is not supported.</td>
</tr>
<tr>
<td>ddboot storage-unit modify</td>
<td>The tenant-unit parameter is not supported.</td>
</tr>
<tr>
<td>ddboot storage-unit show</td>
<td>The tenant-unit parameter is not supported.</td>
</tr>
<tr>
<td>ddboot streams show active</td>
<td>The tenant-unit parameter is not supported.</td>
</tr>
<tr>
<td>ddboot streams show history</td>
<td>The tenant-unit parameter is not supported.</td>
</tr>
<tr>
<td>disk rescan</td>
<td>The &lt;enclosure-ID&gt;.&lt;disk-ID&gt; parameter is not supported.</td>
</tr>
<tr>
<td>disk show state</td>
<td>DD VE system disks show the System Dev state.</td>
</tr>
<tr>
<td>disk show stats</td>
<td>The DD VE format for this command is disk show stats [dev &lt;n&gt;]</td>
</tr>
<tr>
<td>disk status</td>
<td>The Spare row has been removed from the output. The System row has been added.</td>
</tr>
</tbody>
</table>
Table 9 Modified DD OS commands (continued)

<table>
<thead>
<tr>
<th>Command</th>
<th>Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>enclosure show all</td>
<td>The [&lt;enclosure&gt;] parameter is not supported.</td>
</tr>
<tr>
<td>enclosure show controllers</td>
<td>The [&lt;enclosure&gt;] parameter is not supported.</td>
</tr>
<tr>
<td>enclosure show cpus</td>
<td>The [&lt;enclosure&gt;] parameter is not supported.</td>
</tr>
<tr>
<td>enclosure show io-cards</td>
<td>The [&lt;enclosure&gt;] parameter is not supported.</td>
</tr>
<tr>
<td>enclosure show memory</td>
<td>The [&lt;enclosure&gt;] parameter is not supported.</td>
</tr>
<tr>
<td>filesystem encryption keys delete</td>
<td>The [tier {active</td>
</tr>
<tr>
<td>filesystem encryption keys show</td>
<td>The [tier {active</td>
</tr>
<tr>
<td>filesystem fastcopy</td>
<td>The [retention-lock] parameter is supported with DD VE 4.0. Retention lock governance mode is supported for DD VE on premises. Retention lock compliance mode is not supported for any DD VE.</td>
</tr>
<tr>
<td>filesystem show compression</td>
<td>The [tier {active</td>
</tr>
<tr>
<td>filesystem show space</td>
<td>The [tier {active</td>
</tr>
<tr>
<td>mtree create</td>
<td>The tenant-unit parameter is not supported.</td>
</tr>
<tr>
<td>mtree list</td>
<td>The tenant-unit parameter is not supported.</td>
</tr>
<tr>
<td>mtree show compression</td>
<td>The tenant-unit and tenant-unit parameters are not supported.</td>
</tr>
<tr>
<td>mtree show performance</td>
<td>The tenant-unit parameter is not supported.</td>
</tr>
<tr>
<td>net create interface</td>
<td>The &lt;virtual-ifname&gt; parameter is not supported.</td>
</tr>
<tr>
<td>net destroy</td>
<td>The &lt;virtual-ifname&gt; parameter is not supported.</td>
</tr>
</tbody>
</table>
### Performance Troubleshooting

You can check DD VE performance statistics:

- with native tools in AWS

You can also use the following to monitor benchmark performance:

- `perf`

See [Extensions to DD OS for DD VE](#) on page 39 for information about commands.

#### CPU Performance

The two key statistics for CPU performance are:

- CPU usage: CPU usage as a percentage during the interval
- CPU ready: the percentage of time that the virtual machine was ready, but could not get scheduled to run on the physical CPU. This counter might not be displayed by default.

If these counters are high, there may be a performance problem on the hypervisor host.

#### Memory Performance

- The key statistic for memory performance is memory swapping: the current amount of guest physical memory swapped out to the virtual machine’s swap file.

#### Virtual Disk Performance

The key statistics for virtual disk performance are:

- I/O throughput: a decrease in these values indicates a performance issue.
- I/O latency: an increase in read and write latency values indicates a performance problem.
Failed commands: an increase in the average number of outstanding read and write requests indicates a performance problem.

## Unsupported DD OS Commands

The following DD OS commands and command options are not supported on the DD VE platform.

**Table 10 Unsupported Commands and Command Options**

<table>
<thead>
<tr>
<th>Unsupported Command or Command Option</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>adminaccess https generate certificate</td>
<td>Deprecated. Use <code>adminaccess certificate generate</code> instead.</td>
</tr>
<tr>
<td>alerts add</td>
<td>Deprecated. Use <code>alerts notify-list add</code> instead.</td>
</tr>
<tr>
<td>alerts del</td>
<td>Deprecated. Use <code>alerts notify-list del</code> instead.</td>
</tr>
<tr>
<td>alerts notify-list option set group-name</td>
<td>Deprecated. Use <code>alerts notify-list option set group-name</code> instead.</td>
</tr>
<tr>
<td>tenant-alert-summary {enabled</td>
<td>Deprecated. Use `alerts notify-list option set group-name tenant-alert-summary {enabled</td>
</tr>
<tr>
<td>alerts notify-list option reset group-name</td>
<td>Deprecated. Use <code>alerts notify-list option reset group-name tenant-alert-summary</code> instead.</td>
</tr>
<tr>
<td>alerts reset</td>
<td>Deprecated. Use <code>alerts notify-list reset</code> instead.</td>
</tr>
<tr>
<td>alerts show alerts-list</td>
<td>Deprecated. Use <code>alerts notify-list show</code> instead.</td>
</tr>
<tr>
<td>alerts test</td>
<td>Deprecated. Use <code>alerts notify-list test</code> instead.</td>
</tr>
<tr>
<td>archive</td>
<td></td>
</tr>
<tr>
<td>authorization</td>
<td>Deprecated. Use <code>autosupport show report</code> instead.</td>
</tr>
<tr>
<td>autosupport display</td>
<td>Deprecated. Use `autosupport reset { all</td>
</tr>
<tr>
<td>autosupport reset support-list</td>
<td>Deprecated. Use `autosupport show { all</td>
</tr>
<tr>
<td>cifs set authentication nt4</td>
<td>Deprecated. Use <code>cifs set authentication active-directory</code> instead.</td>
</tr>
<tr>
<td>cluster</td>
<td></td>
</tr>
<tr>
<td>dboost fc</td>
<td></td>
</tr>
<tr>
<td>dboost option reset fc</td>
<td></td>
</tr>
<tr>
<td>dboost option show fc</td>
<td></td>
</tr>
<tr>
<td>dboost show image-duplication</td>
<td>Deprecated. Use <code>dboost file-replication show</code> instead.</td>
</tr>
<tr>
<td>dboost user option set user default-tenant-unit tenant-unit</td>
<td></td>
</tr>
</tbody>
</table>
## Table 10 Unsupported Commands and Command Options (continued)

<table>
<thead>
<tr>
<th>Unsupported Command or Command Option</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ddboost user option reset user [default-tenant-unit]</td>
<td></td>
</tr>
<tr>
<td>disk add devdisk-id [spindle-group 1-16]</td>
<td>Deprecated. Use storage add instead.</td>
</tr>
<tr>
<td>disk add enclosure enclosure-id</td>
<td>Deprecated. Use storage add instead.</td>
</tr>
<tr>
<td>disk benchmark start</td>
<td>Not supported by DDVE in cloud</td>
</tr>
<tr>
<td>disk benchmark show</td>
<td>Not supported by DDVE in cloud</td>
</tr>
<tr>
<td>disk benchmark stop</td>
<td>Not supported by DDVE in cloud</td>
</tr>
<tr>
<td>disk benchmark watch</td>
<td>Not supported by DDVE in cloud</td>
</tr>
<tr>
<td>disk expand</td>
<td>Deprecated. Use storage add instead.</td>
</tr>
<tr>
<td>disk fail enclosure-id.disk-id</td>
<td></td>
</tr>
<tr>
<td>disk multipath</td>
<td></td>
</tr>
<tr>
<td>disk port</td>
<td></td>
</tr>
<tr>
<td>disk rescan [enclosure-id.disk-id]</td>
<td></td>
</tr>
<tr>
<td>disk show detailed-raid-info</td>
<td>Deprecated. Use disk show state and storage show instead.</td>
</tr>
<tr>
<td>disk show failure-history</td>
<td></td>
</tr>
<tr>
<td>Disk show performance</td>
<td>Not supported by DDVE in cloud</td>
</tr>
<tr>
<td>disk show raid-info</td>
<td>Deprecated. Use disk show state and storage show instead.</td>
</tr>
<tr>
<td>disk show reliability-data</td>
<td></td>
</tr>
<tr>
<td>disk disk show stats</td>
<td>Not supported by DDVE in cloud</td>
</tr>
<tr>
<td>disk fail</td>
<td></td>
</tr>
<tr>
<td>enclosure beacon</td>
<td>This command is supported, but not with the enclosure argument.</td>
</tr>
<tr>
<td>enclosure show all [enclosure]</td>
<td>This command is supported, but not with the enclosure argument.</td>
</tr>
<tr>
<td>enclosure show chassis</td>
<td></td>
</tr>
<tr>
<td>enclosure show controllers enclosure</td>
<td>This command is supported, but not with the enclosure argument.</td>
</tr>
<tr>
<td>enclosure show cpus [enclosure]</td>
<td>This command is supported, but not with the enclosure argument.</td>
</tr>
<tr>
<td>enclosure show fans</td>
<td></td>
</tr>
<tr>
<td>enclosure show io-cards [enclosure]</td>
<td>This command is supported, but not with the enclosure argument.</td>
</tr>
<tr>
<td>enclosure show memory [enclosure]</td>
<td>This command is supported, but not with the enclosure argument.</td>
</tr>
<tr>
<td>enclosure show nvram</td>
<td></td>
</tr>
<tr>
<td>Unsupported Command or Command Option</td>
<td>Notes</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>enclosure show powersupply</td>
<td></td>
</tr>
<tr>
<td>enclosure show summary</td>
<td></td>
</tr>
<tr>
<td>enclosure show temperature-sensors</td>
<td></td>
</tr>
<tr>
<td>enclosure show topology</td>
<td></td>
</tr>
<tr>
<td>enclosure test topology</td>
<td></td>
</tr>
<tr>
<td>filesys archive</td>
<td></td>
</tr>
<tr>
<td>filesys clean update-stats</td>
<td>Deprecated. Use <code>filesys show space</code> instead.</td>
</tr>
<tr>
<td>filesys encryption</td>
<td></td>
</tr>
<tr>
<td>filesys encryption passphrase change</td>
<td>Deprecated. Use <code>system passphrase change</code> instead.</td>
</tr>
<tr>
<td>filesys retention-lock</td>
<td>Deprecated. Use <code>mtree retention-lock</code> instead.</td>
</tr>
<tr>
<td>filesys show compression tier</td>
<td>The <code>tier</code> option is not supported.</td>
</tr>
<tr>
<td>filesys show history</td>
<td>Deprecated. Use <code>filesys show compression daily</code> instead.</td>
</tr>
<tr>
<td>ha create</td>
<td>Not supported by DDVE in cloud</td>
</tr>
<tr>
<td>ha destroy</td>
<td>Not supported by DDVE in cloud</td>
</tr>
<tr>
<td>ha status</td>
<td>Not supported by DDVE in cloud</td>
</tr>
<tr>
<td>ha failover</td>
<td>Not supported by DDVE in cloud</td>
</tr>
<tr>
<td>ha online</td>
<td>Not supported by DDVE in cloud</td>
</tr>
<tr>
<td>ha offline</td>
<td>Not supported by DDVE in cloud</td>
</tr>
<tr>
<td>license</td>
<td>The <code>license</code> commands are not supported because DD VE uses new <code>elicense</code> commands.</td>
</tr>
<tr>
<td>mtree show compression mtree_path tier</td>
<td></td>
</tr>
<tr>
<td>net aggregate</td>
<td></td>
</tr>
<tr>
<td>net config ifname type cluster</td>
<td></td>
</tr>
<tr>
<td>net create interface virtual-ifname</td>
<td></td>
</tr>
<tr>
<td>net create interface physical-ifname vlan vlan-id</td>
<td></td>
</tr>
<tr>
<td>net create virtual vethid</td>
<td></td>
</tr>
<tr>
<td>net destroy virtual-ifname</td>
<td></td>
</tr>
<tr>
<td>net destroy vlan-ifname</td>
<td></td>
</tr>
<tr>
<td>net failover</td>
<td></td>
</tr>
<tr>
<td>net modify virtual-ifname bonding {aggregate</td>
<td>failure}</td>
</tr>
<tr>
<td>net set portnaming</td>
<td></td>
</tr>
</tbody>
</table>
Table 10 Unsupported Commands and Command Options (continued)

<table>
<thead>
<tr>
<th>Unsupported Command or Command Option</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ndmp</td>
<td></td>
</tr>
<tr>
<td>ndmpd</td>
<td></td>
</tr>
<tr>
<td>perf * module vtl</td>
<td></td>
</tr>
<tr>
<td>san</td>
<td></td>
</tr>
<tr>
<td>shelf migration start</td>
<td>Not supported by DDVE in cloud</td>
</tr>
<tr>
<td>shelf migration status</td>
<td>Not supported by DDVE in cloud</td>
</tr>
<tr>
<td>shelf migration suspend</td>
<td>Not supported by DDVE in cloud</td>
</tr>
<tr>
<td>shelf migration resume</td>
<td>Not supported by DDVE in cloud</td>
</tr>
<tr>
<td>shelf migration precheck</td>
<td>Not supported by DDVE in cloud</td>
</tr>
<tr>
<td>shelf migration finalize</td>
<td>Not supported by DDVE in cloud</td>
</tr>
<tr>
<td>shelf migration show history</td>
<td>Not supported by DDVE in cloud</td>
</tr>
<tr>
<td>snapshot add schedule name [days days] time time [{,time...} [retention period]]</td>
<td>Deprecated. Use snapshot schedule create instead.</td>
</tr>
<tr>
<td>snapshot add schedule name [days days] time every mins [retention period]</td>
<td>Deprecated. Use snapshot schedule create instead.</td>
</tr>
<tr>
<td>snapshot add schedule name [days days] time time-time [every hrs</td>
<td>mins] [retention period]</td>
</tr>
<tr>
<td>snapshot del schedule {name</td>
<td>all}</td>
</tr>
<tr>
<td>snapshot modify schedule name [{days days]</td>
<td>time time [{,time...}</td>
</tr>
<tr>
<td>snapshot modify schedule name [{days days]</td>
<td>time time every {mins</td>
</tr>
<tr>
<td>snapshot modify schedule name [{days days]</td>
<td>time time-time [every {hrs</td>
</tr>
<tr>
<td>snapshot reset schedule</td>
<td>Deprecated. Use snapshot schedule reset instead.</td>
</tr>
</tbody>
</table>
### Table 10 Unsupported Commands and Command Options (continued)

<table>
<thead>
<tr>
<th>Unsupported Command or Command Option</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>snapshot show schedule</td>
<td>Deprecated. Use <code>snapshot schedule show</code> instead.</td>
</tr>
<tr>
<td>storage add enclosure enclosure-id</td>
<td></td>
</tr>
<tr>
<td>storage add disk enclosure-id.disk-id</td>
<td></td>
</tr>
<tr>
<td>storage remove enclosure enclosure-id</td>
<td></td>
</tr>
<tr>
<td>storage remove disk enclosure_id.disk-id</td>
<td></td>
</tr>
<tr>
<td>system firmware</td>
<td></td>
</tr>
<tr>
<td>system option set console</td>
<td></td>
</tr>
<tr>
<td>system retention-lock</td>
<td></td>
</tr>
<tr>
<td>system sanitize</td>
<td></td>
</tr>
<tr>
<td>system show anaconda</td>
<td></td>
</tr>
<tr>
<td>system show controller-inventory</td>
<td></td>
</tr>
<tr>
<td>system show nvram</td>
<td></td>
</tr>
<tr>
<td>system show nvram-detailed</td>
<td></td>
</tr>
<tr>
<td>system show oemid</td>
<td></td>
</tr>
<tr>
<td>system show oemid</td>
<td></td>
</tr>
<tr>
<td>system upgrade continue</td>
<td></td>
</tr>
<tr>
<td>user</td>
<td></td>
</tr>
<tr>
<td>user change priv</td>
<td>Deprecated, with no replacement.</td>
</tr>
<tr>
<td>vserver config set host</td>
<td>Not supported by DDVE in cloud</td>
</tr>
<tr>
<td>vserver config reset</td>
<td>Not supported by DDVE in cloud</td>
</tr>
<tr>
<td>vserver config show</td>
<td>Not supported by DDVE in cloud</td>
</tr>
<tr>
<td>vserver config perf-stats start</td>
<td>Not supported by DDVE in cloud</td>
</tr>
<tr>
<td>vserver config perf-stats stop</td>
<td>Not supported by DDVE in cloud</td>
</tr>
<tr>
<td>vserver config perf-stats status</td>
<td>Not supported by DDVE in cloud</td>
</tr>
<tr>
<td>vtl lunmask</td>
<td>Deprecated. Use <code>vtl group</code> instead.</td>
</tr>
<tr>
<td>vtl lunmask add</td>
<td>Deprecated. Use <code>vtl group add</code> instead.</td>
</tr>
<tr>
<td>vtl lunmask del</td>
<td>Deprecated.</td>
</tr>
<tr>
<td>vtl lunmask show</td>
<td>Deprecated. Use <code>vtl group show</code> instead.</td>
</tr>
</tbody>
</table>
Upgrade DD OS

The Data Domain Operating System can be upgraded using the rpm package file. For more information, refer to the Data Domain Operating System 6.2 Administration Guide.

DD VE system upgrade for higher capacity

1. Shutdown the DD VE using the command `system poweroff`
2. Upgrade the CPU and memory resources and add additional metadata disks that are required for the new configuration as per the following:

   Table 11 Upgrade requirements

<table>
<thead>
<tr>
<th>Instance Type (custom)</th>
<th>#vCPU</th>
<th>Memory</th>
<th>DD Storage Capacity</th>
<th>Metadata disks (num. of disks x size of each disk)</th>
</tr>
</thead>
<tbody>
<tr>
<td>custom-4-16384</td>
<td>4</td>
<td>16 GiB</td>
<td>Up to 16 TB</td>
<td>2 x 1024 GiB</td>
</tr>
<tr>
<td>custom-8-32768</td>
<td>8</td>
<td>32 GiB</td>
<td>Up to 32 TB</td>
<td>4 x 1024 GiB</td>
</tr>
<tr>
<td>custom-16-6553</td>
<td>16</td>
<td>64 GiB</td>
<td>Up to 96 TB</td>
<td>10 x 1024 GiB</td>
</tr>
</tbody>
</table>

3. Power on the DD VE
4. Add the license for the new capacity
5. Configure the newly added metadata disks using the CLI command `storage add dev tier active<device ID>`
6. Expand the file system using the CLI command `filesys expand`

Define the Data Domain System Information for Your Site

An installation requires information unique to your site. Before starting the installation, provide values for the system information listed below.

**Note**

Data Domain recommends that you print the tables in this section and record the information. Be sure to enter the serial number correctly to avoid DD VE issues.

Table 12 System Setup Worksheet for DD VE

<table>
<thead>
<tr>
<th>Information</th>
<th>Your Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>A unique VM name for the system:</td>
<td></td>
</tr>
<tr>
<td>The DNS domain name:</td>
<td></td>
</tr>
<tr>
<td>A default gateway IP address (if you are not using DHCP):</td>
<td></td>
</tr>
<tr>
<td>DNS server IP addresses (if you are not using DHCP):</td>
<td></td>
</tr>
</tbody>
</table>
Table 12 System Setup Worksheet for DD VE (continued)

<table>
<thead>
<tr>
<th>Information</th>
<th>Your Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td></td>
</tr>
<tr>
<td>Secondary</td>
<td></td>
</tr>
<tr>
<td>Tertiary</td>
<td></td>
</tr>
</tbody>
</table>

If you will enable CIFS access, enter the information for your CIFS authentication method:

1. For Workgroup authentication:
   - Workgroup name:
   - Backup user name:
   - Password:

2. For Active Directory authentication:
   - Realm name:
   - Domain admin name:
   - Password

Host name from which to administer the system:

Administrator’s email address (or admin group alias):

Mail server (SMTP) host name:

Region:
   1. Zone
   2. VPC
   3. subnet

Virtual machine unique ID (after initial configuration, use the system show serialno command to display this ID):

Use this table to enter Ethernet connectivity information. By default, DHCP is enabled.

Table 13 Ethernet Connectivity Worksheet

<table>
<thead>
<tr>
<th>Ethernet Connectivity</th>
<th>Enable</th>
<th>Use DHCP</th>
<th>IP Address (if no DHCP)</th>
<th>Netmask (if no DHCP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ethV0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ethV1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ethV2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ethV3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ethV4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Setting Up NTP Time Synchronization

By default, NTP is disabled on the DD VE system. If you need to enable NTP on the DD VE, follow these steps:

**Note**

Skip this task if you are going to join the DD VE to an Active Directory domain. Because the Windows domain controller obtains the time from an external source, NTP must be configured. See the cloud provider documentation on how to configure NTP for the Windows operating system version or service pack that is running on your domain controller. After joining the domain, the system time is periodically synchronized with the domain controller time. When the host joins the Active Directory, the DD VE displays a warning if multiple time sources are in use.

Later, while performing initial configuration of the DD VE system, enable NTP by selecting the appropriate options from the configuration wizards. If you do not use the wizards to perform initial configuration, you can use the `ntp enable` command on the DD OS command line. Enabling NTP with the `ntp enable` command automatically disables synchronizing the time on the guest to the host time.

To reenable synchronizing the guest time to the host time, run the `ntp disable` command.

**Note**

NTP is disabled by default. The `ntp reset` command also deactivates NTP on the guest.

**Note**

For more information about AWS time synchronization, see [AWS NTP Time Synchronization](#).

Configuration of optional software and internal licenses

If you need to configure optional software features, you need to install and activate those licenses before you configure those features. See [DD VE capabilities](#) for information about features and licenses that are available to for DD VE.

Information about installing licenses and configuring optional software can be found in the [Data Domain Administration Guide](#). Refer to the applicable [Data Domain Operating...](#)
System Release Notes for the most up-to-date information on product features, software updates, software compatibility guides, and information about our products, licensing, and service. Access the latest documents at https://support.emc.com.
APPENDIX A

DD VE Cloud Workflow and Recommendations

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Overview of DD VE on Block Storage

DD VE on block storage provides enterprise customers and service providers who are running applications in the public cloud with a dedupe data protection appliance that provides object storage efficiency and ease of management. Supported cloud platforms include Amazon Web Services (AWS), Microsoft Azure, and Google Cloud Platform (GCP). It is important to note that DD VE on block storage is deployed in these environments differently.

DD VE on block storage supports:

- Backup/restore using active tier's data into cloud block storage while DD VE is running in the cloud.
- DD SM to configure, manage, and monitor DD VE on block storage.
- DD MC for multisystem management of DD VE systems in the cloud on block storage.

Configuring DD VE on block storage using the DD SM interface

DD VE can be configured as an active tier on block storage system using the DD SM interface option.

Configuring DD VE on block storage using the DD SM interface (http/https)

Procedure

1. The GUI configuration wizard helps go through the active tier configuration and file system creation on DD VE. Login with the account name: sysadmin and the password specified at deployment.

2. Proceed without selecting the “Enable Object Store” checkbox to configure active tier on block storage. Click “Next”.

3. Add the block storage attached to the DD VE to the active tier.

   Note
   
   For block storage solution, the maximum supported storage capacity is 16 TB.

4. Review the summary and select “Submit” to create the file system and enable it.

5. The File System section under the Data Management tab has the space usage and availability details for block storage.

6. To configure or update the eLicense on the DD VE, select “Replace License”s on the Licenses page.

7. To relaunch the configuration wizard, select “Configure System” under “Maintenance”, then select “Configure System”.

Network infrastructure setup

This section describes security group restrictions for AWS.

Security groups

The security groups restrict access to an instance based on
1. Port
2. IP range
3. Security group (its own or another)

Inbound control
The security groups are stateful which means that the responses to the inbound traffic will be allowed to go out regardless of outbound rules. The following are the inbound ports that are allowed for DD VE.

Table 14 DD VE Inbound Ports

<table>
<thead>
<tr>
<th>Port</th>
<th>Service</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCP 22</td>
<td>SSH</td>
<td>Used for SSH (CLI) access and for configuring DD VE.</td>
</tr>
<tr>
<td>TCP 443</td>
<td>HTTPS</td>
<td>Used for DDSM (GUI) access and for configuring DD VE.</td>
</tr>
<tr>
<td>TCP 2049</td>
<td>DD Boost/NFS</td>
<td>Main port used by NFS - can be modified using the <code>nfs set server-port</code> command which requires SE mode.</td>
</tr>
<tr>
<td>TCP 2051</td>
<td>Replication/DD Boost/ Optimized Duplication</td>
<td>Used only if replication is configured (run <code>replication show config</code> on Data Domain system to determine). This port can be modified using <code>replication modify</code>.</td>
</tr>
<tr>
<td>TCP 3009</td>
<td>SMS (system management)</td>
<td>Used for managing a system remotely using Data Domain System Manager. This port cannot be modified. This port is used only on Data Domain systems running DD OS 4.7.x or later. This port will also need to be opened if you plan to configure replication from within the Data Domain System Manager, as the replication partner needs to be added to the Data Domain System Manager.</td>
</tr>
</tbody>
</table>

Depending on the protocol that is used to backup data to DD VE, additional ports will be allowed with inbound security group rules.

Note
For the complete list of inbound ports that are used by DD VE, please refer to Inbound Ports Table. Depending on the protocol used the respective ports shall be allowed.

Outbound control
As stated earlier the security groups are stateful, which means that if a request is allowed to be sent out of a DD VE, its responses will be allowed regardless of inbound rules. The following are the outbound ports that shall be allowed for DD VE.

Table 15 DD VE Outbound Ports

<table>
<thead>
<tr>
<th>Port</th>
<th>Service</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UDP 123</td>
<td>NTP</td>
<td>Used by the Data Domain system to synchronize to a time server.</td>
</tr>
<tr>
<td>TCP 443</td>
<td>HTTPS</td>
<td>Used for DD VE to be able to communicate with Object store (S3).</td>
</tr>
<tr>
<td>TCP 2049</td>
<td>DD Boost/NFS</td>
<td>Main port used by NFS - can be modified using the <code>nfs set server-port</code> command which requires SE mode.</td>
</tr>
</tbody>
</table>
Table 15 DD VE Outbound Ports (continued)

<table>
<thead>
<tr>
<th>Port</th>
<th>Service</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCP 2051</td>
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<td>Used for managing a system remotely using Data Domain System Manager. This port cannot be modified. This port is used only on Data Domain systems running DD OS 4.7.x or later. This port will also need to be opened if you plan to configure replication from within the Data Domain System Manager, as the replication partner needs to be added to the Data Domain System Manager.</td>
</tr>
</tbody>
</table>

Depending on the other applications/services that are being used, additional ports shall be allowed.

**Note**

For the complete list of outbound ports that are used by DD VE, please refer to Outbound ports table. Depending on the protocol used the respective ports shall be allowed.

---

**Network setup recommendations**

**Network setup in AWS**

**VPC Architecture**

We recommend you use public or private subnet architecture to deploy the DD VE in private subnet. It will secure the DD VEs (VMs) with the appropriate use of various VPC components such as route tables, access control lists, security groups, etc.

**Public IP address**

Due to security considerations and in order to protect the DD VE from potential attacks over open internet, the DD VE MUST NOT be exposed using Public IP directly over internet. It is highly recommended that you use VPN connections between different geographical regions (VPCs). For example, the replication between different VPCs, different cloud regions, cloud to on-premise and vice versa can be used via the secure VPN connection.

**Object store connectivity**

The DD VE object store feature needs connectivity to its object storage, such as to the S3 bucket. The object store communication is over https, so the outbound security group setting must allow communication over port 443. There are different ways to enable DD VE connectivity to the object store. Out of the following three we recommend only the third option (Using VPC endpoint).

- Using the public IP from the public subnet: should not be used
- Using NAT (Network Address Translation): If the private subnet is configured to use NAT, then DD VE will be able to communicate to object store over NAT.
- We strongly recommend using VPC endpoint for accessing the Amazon S3. It does not require the DD VE to have a public IP address to communicate to S3, it uses
the private IP address instead. (In this case, an internet gateway, NAT, or virtual private gateway are not needed to access S3). This method also allows the traffic to the S3 endpoint to stay within the Amazon network and will be routed internally to S3.

Note

- Refer to Role based access for S3 object store for configuring the DD VE to access the S3 bucket securely.
- The S3 bucket that was created for DD VE use, MUST be in the same region where DD VE is running.
- For information see Amazon AWS documentation.

Setting Up NTP Time Synchronization in AWS

It is important for the DD VE’s time to be properly synchronized. Any drift in time might impact the object store communication, system time is one component required for secure communication. Therefore, NTP must be configured for the DD VE that is running in AWS. While performing initial configuration of the DD VE system, enable NTP and configure the NTP server. If you do not use the CLI configuration wizard to perform initial configuration, you can use the `ntp enable` command on the DD OS command line. According to AWS documentation use the following details to configure NTP if you do not have your own NTP server.

```
server 0.amazon.pool.ntp.org
```

Follow the steps below to configure NTP on the DD VE (using GUI)

Procedure

1. Select the settings under the Administration tab.
2. Select “Configure Time Settings” from the drop down menu of “More Tasks”.
3. Select the “Manually Configure” option under NTP and add the NTP servers as 0.amazon.pool.ntp.org

4. Run the following commands to configure NTP on the DD VE (using CLI)
   - `ntp add timeserver 0.amazon.pool.ntp.org`
   - `ntp enable`
   - `ntp sync`