CONTENTS

Revision history 5

Preface 7

Chapter 1 Getting Started 9
Purpose of this guide ........................................................................................................... 10
Audience .................................................................................................................................. 10
Prerequisites, limitations, and resources ................................................................................. 10
Architecture overview ............................................................................................................. 11

Chapter 2 Introducing DDVE 13
Introducing DDVE ................................................................................................................ 14
DDVE cloud features ............................................................................................................. 14

Chapter 3 Deploying DDVE 17
Preparing your environment to deploy DDVE on AWS ........................................................ 18
Create an S3 bucket ................................................................................................................ 18
Set up role-based access to the AWS object store ................................................................. 20
Deploying DDVE in AWS ....................................................................................................... 22
Deploying DDVE using a Cloud Formation Template .......................................................... 23
Deploying DDVE manually from the AWS console .............................................................. 26
Expand metadata storage ....................................................................................................... 29

Chapter 4 Completing Initial DDVE Configuration 31
Configuring DDVE on AWS ................................................................................................... 32
Using the DD System Manager to configure DDVE ............................................................. 32
Using the CLI to configure the DDVE .................................................................................. 35
Recovering DDVE with system headswap ........................................................................... 40
Recovering the system ........................................................................................................... 42

Chapter 5 Administering DDVE 45
Upgrade from M4 to M5 instance type ................................................................................. 46
Upgrading M5 instance type .................................................................................................. 46
Adding virtual storage ........................................................................................................... 47
 Configuring spindle groups .................................................................................................... 47
 Extensions to DDOS for DDVE ............................................................................................. 47
 perf ....................................................................................................................................... 47
 system vresource .................................................................................................................. 48
 DDVE-only commands ......................................................................................................... 48
 Modified DD OS commands ................................................................................................. 49
 Unsupported DD OS commands ............................................................................................ 52
 Troubleshooting performance issues .................................................................................... 57
## Contents

**Appendix A**  
Best Practices for Working with DDVE in the Cloud  
- ASUP configuration .......................................................... 60  
- AWS licensing ............................................................... 60  
- Storage best practices .................................................. 60  
- Security best practices .................................................. 62

**Appendix B**  
Networking Best Practices for DDVE in the Cloud  
- Network setup in AWS ..................................................... 66  
- Network infrastructure setup .......................................... 67

**Appendix C**  
Installing and Configuring DDVE on Block Storage in the Cloud  
- Overview of DDVE on block storage ................................. 70  
- Configuring DDVE on block storage with DD System Manager .......... 70
Revision history

Table 1 DDVE 5.0 on AWS Installation and Administration Guide revision history

<table>
<thead>
<tr>
<th>Revision</th>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>May 2020</td>
<td>Initial Publication (with DD OS 7.2)</td>
</tr>
</tbody>
</table>
Revision history
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 DD Virtual Edition (DDVE) systems.

**Audience**

This manual is intended for use by both system administrators and general users of DD Virtual Edition.

**Related documentation**

The following publications and websites provide additional information:

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

**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 DDVE, 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](mailto:DPAD.Doc.Feedback@emc.com).
Preface
CHAPTER 1

Getting Started

This chapter includes the following topics:

- **Purpose of this guide**............................................................................................................. 10
- **Audience**................................................................................................................................ 10
- **Prerequisites, limitations, and resources**............................................................................... 10
- **Architecture overview**............................................................................................................. 11
Purpose of this guide

This installation guide is intended as a supplement to the *DD Operating System Administration Guide*, which includes content applicable to all DD systems, including upgrading the DDVE software and using the DD System Manager to monitor DD systems for errors, disk space, and service events.

This guide contains content specific to deploying DD Virtual Edition (DDVE) on Amazon Web Services. Use this guide in conjunction with the *DD Operating System Administration Guide* and applicable AWS documentation.

See [AWS Cloud Formation documentation](https://aws.amazon.com/cloudformation/) for more information.

Audit

This document is intended for data protection and storage administrators who want to use Amazon Web Services to back up DD Virtual Edition (DDVE) content. Users should have knowledge of the following technology:

- AWS Management Console
- AWS services, such as AWS IAM, AWS CloudFormation, VPC, AWS security group, and route tables
- Amazon EC2, EBS, and S3 services

Prerequisites, limitations, and resources

Review the general requirements for deploying DDVE on Amazon Web Services (AWS).

**Create an AWS account**

To deploy DDVE on AWS, you must have an AWS account. To set up an account, go to [https://aws.amazon.com/getting-started/](https://aws.amazon.com/getting-started/).

**Identity and access management**

AWS recommends that you create an IAM user or role for authenticating with AWS and never use root credentials to deploy the CloudFormation template. The IAM user must be allowed to perform AWS CloudFormation actions. The EC2 instance must be granted the IAM role to provide permissions to S3 storage.

The following links provide more information about AWS best practices:

- [Creating an IAM User in Your AWS Account](https://aws.amazon.com/start/)
- [Using IAM Roles](https://aws.amazon.com/start/)
- [What is AWS CloudFormation?](https://aws.amazon.com/start/)

**Security and operational best practices**

Amazon recommends that you enable AWS CloudTrail logs to enable governance, compliance, and operational and risk auditing of your AWS account. AWS CloudTrail enables you to:

- View the event history of your AWS account activity, including AWS Management Console actions, AWS SDKs, CLI, and other AWS services.
- Identify the initiator of actions, resources involved, and event timing.

This event history helps to simplify security analysis, resource change tracking, and troubleshooting.

The following links provide more information:
• Working with CloudTrail
• Turn on CloudTrail across all regions and support for Multiple Trails

**AWS service limits and restrictions**

The following links provide more information about AWS service limits and restrictions:

• Bucket Restrictions and Limitations
• IAM and STS Limits
• How do I manage my AWS service limits?
• AWS Service Quotas

**Additional links**

The following additional links provide more information about the AWS features that are used with a DDVE deployment:

• Working with the AWS Management Console
• AWS Cloud Formation
• AWS Identity and Access Management (IAM)
• Amazon Virtual Private Cloud
• Amazon Elastic Compute Cloud Documentation

**Architecture overview**

DDVE is a virtual deduplication appliance that provides data protection for entry, enterprise, and service provider environments.

The following diagram represents the architecture of the DDVE on AWS solution.

**Figure 1** Dell EMC Power Protect DD Virtual Edition (DDVE) on AWS

Legend:
1. To keep data traffic between DDVE and the S3 bucket within the AWS infrastructure, it is recommended that you create an S3 endpoint. The S3 endpoint keeps DDVE from depending on a NAT Gateway or Public IP address to access the S3 bucket.

2. To keep data transfers secure, it is recommended to use a VPN connection to replicate data from an on-premises host to DDVE in the cloud or the opposite way.

3. DDVE is categorized as a backend server. It must be kept in a private subnet with a private address. Never set a public IP address for DDVE.

4. It is recommended that you create the S3 bucket in the region where the DDVE instance is running. A separate bucket per each DDVE is required.

5. All DDVE instances must be secured with the appropriate security group entries.
   Typically SSH (Port 22) or HTTPS (Port 443) is used for DDVE inbound access. HTTPS (443) must be allowed for outbound S3 bucket access for DDVE.
   TCP ports 2049 and 2051 are used for DD Boost and replication purposes.
   See the DDVE documentation for more information and for a complete list of ports.

**Availability Zones**

DDVE is deployed within a single Availability Zone (AZ). It can be deployed within additional AZs to provide region redundancy using DD replication capabilities. The solution can also be deployed in alternative regions to provide further redundancy as needed.
CHAPTER 2

Introducing DDVE

This chapter includes the following topics:

- Introducing DDVE ................................................................. 14
- DDVE cloud features ............................................................ 14
Introducing DDVE

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

DDVE runs the DD Operating System (DD OS), and includes the DD System Manager graphical user interface (GUI) and the DD OS command line interface (CLI) for performing system operations.

DDVE includes the following features:

- High-speed, variable length deduplication for a 10 to 30 times reduction in storage requirements
- Unparalleled data integrity to ensure reliable recovery, and seamless integration with leading backup and archiving applications
- DD Boost to speed backups by 50 percent
- DD Encryption for enhanced security of data
- DD Replicator for network efficient replication that enables faster time-to-DR readiness

DDVE runs on two types of platforms:

- On premises, DDVE supports VMware, Hyper-V, KVM, and VxRail.
- In the cloud, DDVE also runs in the Amazon Web Services (AWS) (cloud and gov cloud), Azure (cloud and gov cloud), VMware Cloud (VMC) on AWS cloud platforms, and Google Cloud Platform (GCP).

For more information about the features and capabilities of DD systems (both physical and virtual), see the *DD Operating System Administration Guide*.

## DDVE cloud features

DDVE provides the capabilities of a cloud DD system using the following resource configuration sizes:

**Table 2 DDVE on AWS resource configuration size**

<table>
<thead>
<tr>
<th>Type</th>
<th>Resource configuration size</th>
</tr>
</thead>
<tbody>
<tr>
<td>DDVE on Block storage</td>
<td>up to 16 TB</td>
</tr>
<tr>
<td>DDVE on S3 storage</td>
<td>up to 96 TB</td>
</tr>
</tbody>
</table>

The following sections list supported DD protocols and features in DDVE.

### Supported DD protocols

- DD Boost over IP
- DD Boost FS

### Supported DD features

- DD Boost managed file replication (MFR)
- Encryption
- MTree replication
- DD System Manager GUI for DDVE management
- Secure multitenancy (SMT) with Network Isolation Support
- DD Boost/BoostFS for Big Data
- Key Management Interoperability Protocol (KMIP)
- More restricted IPtables settings
- AWS for Government Cloud

**Note:** DDVE supports these replication capabilities:
- Managed file replication and MTree replication
- Replication across availability zones and regions
- Bi-directional replication between on-premises and AWS
- DDVE supports a maximum of six active MTrees at a given time, however up to 100 MTrees can be created on the DDVE.

The *DD OS Administration Guide, DD Boost OST Guide, DD Boost for Partner Integration Administration Guide* provide additional information about supported protocols and features.
Introducing DDVE
CHAPTER 3
Deploying DDVE

This chapter includes the following topics:

- Preparing your environment to deploy DDVE on AWS ............................................................ 18
- Deploying DDVE in AWS ........................................................................................................ 22
Preparing your environment to deploy DDVE on AWS

While DDVE is running in AWS cloud, customers can backup and restore their operational data from an S3 object store.

The following sections provide general guidelines to deploy, configure, and run DDVE on AWS with Active Tier on S3 storage.

The high-level steps are as follows:

1. Configure the network environment.
   For secure access to the DDVE, Dell EMC recommends that you use the VPC architecture that AWS provides. Configure the following components:
   - VPC
   - Subnet
   - Route tables
   - Security groups
   - Network access control list
   - VPC Gateway endpoint for connectivity to S3
   
   **Note:** DDVE supports only legacy endpoint format. If you configure firewall rules for endpoints, requests that map to the legacy endpoints (*.s3-<region>.amazonaws.com) must be allowed instead of the standard endpoints (*.s3.<region>.amazonaws.com).

   *Networking Best Practices for DDVE in the Cloud* on page 65 provides more information.

2. Create an S3 bucket.

3. Configure role-based access to the AWS object store.

4. For secure login to DDVE, create an EC2 key access pair. See *Amazon EC2 Key Pairs* for instructions.

Create an S3 bucket

**About this task**

Create a bucket in S3 and make note of the bucket name. The bucket name is used in the IAM policy template to get access to the bucket. It is also used to create the object store profile on the DDVE.

**Procedure**

1. Log in to the AWS console. Select Services > S3.
2. Click **Create bucket** and enter the bucket name and region.

   **Note:** Observe these requirements when creating a bucket for DDVE use:

   - To access an S3 bucket, AWS recommends using hosted-style URLs (where domain name includes the bucket name) instead of path-style URLs. For hosted-style URLs to work, do not use dots ("."") in the bucket name.
   - Create the bucket in the same region as the DDVE instance.
   - Provide a bucket name that is no longer than 48 characters.
   - Do not enable bucket versioning for the bucket that is associated with the DDVE. Versioning adds to storage costs because older versions of the objects are retained.
despite running the DDVE garbage collection process. Enabling versioning can also cause potential performance issues.

3. Click **Create Bucket**.

![Create Bucket](image)

**Note:** Do not set up life-cycle rules for this bucket. Life-cycle rules could cause loss of critical data from the object store.
Set up role-based access to the AWS object store

Object store in AWS uses role-based access for S3 access. To access the S3 bucket, create and attach the Identity and Access Management (IAM) role to DDVE.

Before you begin

To create the IAM role and the policy that is associated with the role, the AWS user must have the necessary IAM privileges. The following IAM privileges and actions 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"
```

About this task

When the role is attached to DDVE, the S3 object store credentials are automatically fetched. The AWS infrastructure periodically rotates the access credentials. The DDVE automatically fetches the new credentials before the old credentials expire.

Procedure

1. Create the policy to attach with the IAM role:
   a. Sign in to the AWS Management Console and open the IAM Service Console.
   b. In the navigation pane of the IAM console, select Policies > Create policy.
   c. Do one of the following:
      - Create a policy for AWS Standard Cloud:
        In the Create policy web page, select the JSON tab. Replace the text under the JSON tab with the following content. Replace my-bucket-name with the name of the bucket that was created previously.
        ```json
        {
        "Version": "2012-10-17",
        "Statement": [
        {
        "Effect": "Allow",
        "Action": [
        "s3:ListBucket",
        "s3:GetObject",
        "s3:PutObject",
        "s3:DeleteObject"
        ],
        "Resource": [
        "arn:aws:s3:::my-bucket-name",
        "arn:aws:s3:::my-bucket-name/*"
        ]
        }
        ]
        }
        ```
• Create a policy for AWS Gov Cloud:
In the Create policy web page, select the JSON tab. Replace the text under the JSON tab with the following content. Replace my-bucket-name with the name of the bucket that was created previously. For the resource tag below, use arn:aws-us-gov:s3:::my-bucket-name for AWS Gov clouds.

```json
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "s3:ListBucket",
        "s3:GetObject",
        "s3:PutObject",
        "s3:DeleteObject"
      ],
      "Resource": [
        "arn:aws-us-gov:s3:::my-bucket-name",
        "arn:aws-us-gov:s3:::my-bucket-name/*"
      ]
    }
  ]
}
```

d. Verify this information, and then click Review policy.

e. Provide a name and description for the policy.

![Create policy](image)

**Note:** Make a note of the policy name. It will be used to attach the policy to the role in the next step.

2. Create the role for S3 bucket access:
   a. In the navigation pane of the IAM console, select Roles > Create role.
   b. On the Create role page:
a. For **Select type of trusted entity**, select **AWS service**.

b. For **Choose the service that will use this role**, select **EC2**, and then click **Next Permissions**.

c. On the **Attach permissions policies** page, select the policy that you created in the previous section. Select **Next Tags** to create a tag for the role.

- **Figure 2** Creating a role

  ![Create role](image)

  - **Set permissions boundary**

  d. Click **Next:Review**. In the **Review** section, provide a name for the role and click **Create role**.

**After you finish**

You must attach the role to the DDVE instance before it can be configured. This task can be done during or after deployment.

## Deploying DDVE in AWS

You can deploy DDVE on AWS in two ways.

**About this task**

Methods of deployment in AWS:

- Cloud Formation Template (CFT) from AWS marketplace
- DDVE Manual Deployment from AWS console

Dell EMC strongly recommends using the CFT method because it automatically creates and attaches NVRAM and metadata disks in the correct order according to **Storage best practices**.
Deploying DDVE using a Cloud Formation Template

This method is recommended.

Procedure

1. Go to the appropriate Website:

2. Search for PowerProtect DD Virtual.

3. Select Dell EMC PowerProtect DD Virtual Edition (DDVE) <version_number> and click Continue to Subscribe.

   Note: Your screen might be different than shown in the following figure.

   Figure 3 Deploying DDVE using a CFT

4. Click Continue to Configuration.

   Figure 4 Subscribing to the software
5. Select the following configuration, and then click Continue to Launch.
   - **Fulfillment Option**—Select Cloud Formation Template.
   - **Software Version**—Select the correct version.
   - **Region**—Select where the DDVE is to deploy.

![Figure 5 Configuring software](image)

6. Review the configuration details, select Launch the Cloud Formation template, and then select Launch.

   The template URL is populated.

7. Click Next.

8. Enter the following values to create the stack.
   - **Stack name**
   - **DDVE Capacity**—Select any capacity from the drop-down list. The template automatically attaches the recommended amount of metadata storage and the instance type for your selection.

<table>
<thead>
<tr>
<th>System capacity</th>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 TB</td>
<td>M5.xlarge</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>System capacity</td>
<td>Instance type</td>
<td>vCPU</td>
<td>Memory (GiB)</td>
</tr>
<tr>
<td>-----------------</td>
<td>--------------</td>
<td>------</td>
<td>-------------</td>
</tr>
<tr>
<td>32 TB</td>
<td>M5.2xlarge</td>
<td>8</td>
<td>32</td>
</tr>
<tr>
<td>96 TB</td>
<td>M5.4xlarge</td>
<td>16</td>
<td>64</td>
</tr>
</tbody>
</table>

- DDVE name tag
- IAM Role for S3 access—Type in the correct IAM role to be attached to the DDVE.
- Key pair—Select an existing key pair from the drop-down list.
- Subnet ID
- Security Group ID

Note: The values in this figure are examples only. Replace them with values from your setup.

9. Continue stack configuration as needed. Click Next.
10. Review the stack configuration and click Create Stack.
11. Check the status of the stack you create on the ddve-stack-test page.
12. When the stack creation is complete, go to the EC2 instances and select the region to deploy the DDVE. Use the DDVE name tag from step 8 and verify that the corresponding EC2 instance is running.

Deploying DDVE manually from the AWS console

This is an alternate approach for deployment.

Procedure

1. Login to AWS console and navigate to the EC2 instances link.
2. Under the **EC2 instances** tab, select **Private Images**. Select the AMI image from the region in which you wish to deploy DDVE, and then click **Launch**.

3. Select the instance type from the three supported instance types. Click **Configure Instance Details**. For more details, refer to **Storage best practices**.

4. Select the VPC and subnet in which to deploy DDVE, and select the IAM role that you created in the previous section. Selecting the role during deployment automatically attaches it to this DDVE instance. If you did not previously create the VPC, subnet, or the IAM role, you can create them in this step. When you are done, click **Add Storage**.
5. Add the NVRAM disk and metadata disks as shown below. Then click Add Tags.
   a. Add a 10 GiB NVRAM disk (highlighted in red).
   b. Add the metadata disks (highlighted in green) according to the following configuration table.

   ![Configuration Table](image)

   **Note:** It is important to add the NVRAM disk **before** adding the metadata disks. Adding them in a different order causes an unsupported hardware configuration error. Also, ensure that the EBS volume type is GP2 for all disks.

   **Table 3 Configuration**

<table>
<thead>
<tr>
<th>Instance Type</th>
<th>Number of metadata disks</th>
<th>Size of each metadata disk</th>
<th>Object store capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>M5.xlarge</td>
<td>2</td>
<td>1 TiB</td>
<td>16 TB</td>
</tr>
<tr>
<td>M5.2xlarge</td>
<td>4</td>
<td>1 TiB</td>
<td>32 TB</td>
</tr>
<tr>
<td>M5.4xlarge</td>
<td>10</td>
<td>1 TiB</td>
<td>64 TB</td>
</tr>
</tbody>
</table>

6. Add the tags as shown in the following figure, and then click **Configure Security Groups**.
Adding tags enables you to easily search for volumes and instances.

7. Select from an existing security group. If you haven't created one previously, you can create it now. Click **Review and Launch**.

8. Review the configuration details, and then click **Launch**.

9. Select a key pair value or create a new key pair value for this instance, and then click **Launch Instance**.
10. Click View instances to navigate to the EC2 instance tab. Search for the tag you created in step 6.

Expanding metadata storage

Expand metadata storage by adding new metadata disks.

Before you begin

It is recommended that you expand metadata storage by adding new metadata disks. When the total number of metadata disks reaches its limit, you can expand metadata storage by increasing the size of existing metadata disks.

- Before expanding metadata storage, disable the file system.
- You cannot expand the first metadata disk.
• When expanding the size of an existing metadata disk, it is recommended to expand it in 1 TiB increments.

• Shrinking the metadata disk is not supported.

Procedure

1. Shut down the DDVE instance by using the system poweroff command.

2. Log in to the AWS web console.
   a. From the Volumes tab, select the metadata disk that you want to expand.
      
      Note: The first metadata disk is not available for expansion.

   b. Click Actions > Modify Volume.

   c. Change the size of the metadata disk (for example, from 1024 TiB to 2048 TiB), and click Modify.

3. To increase the size of other metadata disks, if required, repeat step 2 on page 30.

4. From the AWS web console, select the DDVE and start it.

5. Disable the file system with the filesys disable command.

6. Expand metadata storage with the filesys expand command.

7. Enable the file system by using the filesys enable command.

8. To confirm the metadata storage expansion, use the filesys show space tier active local-metadata command.
CHAPTER 4

Completing Initial DDVE Configuration

This chapter includes the following topics:

- Configuring DDVE on AWS ................................................................. 32
- Recovering DDVE with system headswap ...................................... 40
- Recovering the system ................................................................. 42
Configuring DDVE on AWS

You can use the DDSM interface or the CLI to configure the DDVE on AWS.

Before you begin

Ensure that you complete the following:

- Consider metadata storage size and count requirements. See Storage Best Practices.
- Create an S3 bucket in the same region in which DDVE is deployed. Create a bucket in AWS provides instructions.
- Make a note of the bucket name. You will need it to create the object store profile.

About this task

Use one of the following procedures to configure the DDVE on AWS:

- Using the DD System Manager to configure DDVE on page 32
- Using the CLI to configure the DDVE on page 35

Using the DD System Manager to configure DDVE

Use this procedure to configure DDVE on AWS using the DD System Manager interface.

Procedure

1. Log in to DD System Manager using the DDVE IP address. The default login credentials for the DDVE instance are:
   - Username: sysadmin
   - AWS default password: Default sysadmin password is the EC2 instance-id for the DDVE

2. Add licenses. Select from the list of options of licenses to apply:
   - Pre-Installed Evaluation License
     - Note: If you begin the configuration with the evaluation license, but want to purchase a license later, you need the Node Locking ID for the DDVE instance. Click Administration > Licenses to view the Node Locking ID.
   - License File
   - License Server (if available)

3. Accept the End User License Agreement.

4. The configuration wizard is launched automatically. Leave the Network settings as default and click No to proceed.

5. Click Yes to set up File System configuration.

6. For the Storage Type, select Object Store and enter the passphrase and the bucket name. For AWS GovCloud, there is an option to select the FIPS endpoint, as shown in the following figure.
7. For Configure CA Certificates, import the Baltimore CyberTrust Root certificate to communicate with AWS S3 Object Store.

8. Configure Storage. Under Available Storage, select the disks and click Add to Metadata to move them to the Metadata Storage section. Add the disks to the active tier to add the metadata storage disk to the instance.

9. On the File System Summary Page, select the Summary tab to review all the fields. Select Enable file system after creation and click Submit.

10. The file system is created and enabled.

11. Click OK to go to the System Settings tab.

12. Change the DDVE password.
13. Configure the email server as required.

**Figure 10 Configure email server**

14. Click **Submit** to save the system settings. Close the wizard.

15. DDVE must have accurate and consistent time synchronization for object store communication. DDVE can synchronize time by using Amazon Time Sync Service or by configuring an NTP server.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Method 1 - Using Amazon Time Sync Service</strong></td>
<td>By default, DDVE uses Amazon Time Sync Service for time synchronization through a chrony client. DDVE does not require Internet access or configuration of security group rules to use this time synchronization service. Dell EMC recommends using the Amazon Time Sync Service.</td>
</tr>
<tr>
<td><strong>Method 2 - Configuring NTP server</strong></td>
<td>To override the default, you can configure an NTP server on the DDVE:</td>
</tr>
<tr>
<td></td>
<td>a. Select <strong>Administration &gt; Settings</strong>.</td>
</tr>
<tr>
<td></td>
<td>b. Select <strong>More Tasks &gt; Configure Time Settings</strong>.</td>
</tr>
<tr>
<td></td>
<td>c. Under <strong>More Tasks</strong>, select <strong>NTP &gt; Manually Configure</strong> and add the NTP servers as 0.amazon.pool.ntp.org.</td>
</tr>
</tbody>
</table>

**Note:** To switch to the default service (Amazon Time Sync), select **Administration > Settings > More Tasks > Configure Time Settings > Choose None**.

**Results**

The DDVE configuration is complete.
Updating the configuration

If you modify the object-store profile or make other changes after the initial DDVE configuration, you will need to relaunch the configuration wizard.

Procedure

1. Select Maintenance > System.
2. Select Configuration System.
3. Select Data Management > File System to view object store local metadata storage.

Using the CLI to configure the DDVE

You can log in through SSH to configure the DDVE using the command line interface (CLI). Authentication using EC2 key access pair and username and password are supported.

Procedure

1. Log in to the DDVE instance to configure the system. The default login credentials for the DDVE instance are:
   - Username: sysadmin
   - AWS default password: Default sysadmin password is the EC2 instance-id for the DDVE.

   ```
   # ssh sysadmin@<IP address of DDVE>
   EMC DD Virtual Edition
   Password:
   Welcome to Data Domain OS 7.2.0.5-xyz
   sysadmin@myddve0#
   ```

2. During the first login, users are prompted to accept the EULA and change the password.
3. The configuration wizard launches.
4. Follow the steps in the wizard to add an elicense and to configure object store.

Note:

- If an elicense file cannot be found in /ddr/var, the license can be pasted directly in the wizard.
- The System Passphrase is required to encrypt the object store credentials. If file system encryption is enabled, the System Passphrase is also used to encrypt keys.
- For AWS, the profile creation requires that you import the Baltimore CyberTrust Root certificate to communicate with the object store.
- For AWS GovCloud, profile creation has an additional option to enable the FIPS endpoint.

Welcome to Data Domain OS 7.2.0.5-xyz
-----------------------------------------
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]: yes

Available eLicense Files
#   File Name
-   ------------
1   elicense.lic
-   ------------

Do you want to use an existing elicense file (yes|no) [yes]:
Enter the index of elicense file [1|cancel]
:1

Pending eLicense Settings
Existing Licenses:
<table>
<thead>
<tr>
<th>#</th>
<th>Feature</th>
<th>Capacity</th>
<th>Type</th>
<th>State</th>
<th>Expiration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CAPACITY</td>
<td>87.31 TiB</td>
<td>permanent (int)</td>
<td>active</td>
<td>n/a</td>
</tr>
</tbody>
</table>

** System is using internal licenses.

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

** New license(s) will overwrite existing license(s).
Do you want to save these settings (Save|Cancel|Retry): Save

Successfully updated eLicenses.

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

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

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

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

SMT Configuration
Configure SMT at this time (yes|no) [no]: yes
Do you want to enable object store (yes|no) [yes]: yes
A passphrase needs to be set on the system.
Enter new passphrase:
Re-enter new passphrase:
Passphrases matched.

Configure object store
DD VE is running in AWS. Role-based access will be used to access s3.
Enter the bucket name: sharms62-atos-bkt1
Do you want to use the FIPs 140-2 endpoint (yes|no) [no]: no
Object-store endpoint needs the Baltimore CyberTrust Root certificate to be imported.
Do you want to import that certificate with below fingerprint?
(yes|no) [yes]: yes

Pending Object Store Settings
Bucket name: sharms62-atos-bkt1
Do you want to save these settings (Save|Cancel|Retry): Save
The passphrase is set
Successfully set object store profile.
Configuration complete.

5. Run the following command to view the disks that are attached to the DDVE:

```bash
# disk show hardware
```

<table>
<thead>
<tr>
<th>Disk</th>
<th>Slot</th>
<th>Manufacturer/Model</th>
<th>Firmware</th>
<th>Serial No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>capacity</td>
<td>type</td>
<td>(pci/idx)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>---------</td>
<td>-------------------</td>
<td>--------</td>
<td>----------</td>
</tr>
<tr>
<td>dev1</td>
<td>-/a</td>
<td>Virtual BLOCK Device</td>
<td>n/a</td>
<td>(unknown) 250.0</td>
</tr>
<tr>
<td>Gib</td>
<td>BLOCK</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>dev2</td>
<td>-/b</td>
<td>Virtual BLOCK Device</td>
<td>n/a</td>
<td>(unknown) 10.0</td>
</tr>
<tr>
<td>Gib</td>
<td>BLOCK</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>dev3</td>
<td>-/c</td>
<td>Virtual BLOCK Device</td>
<td>n/a</td>
<td>(unknown) 1.0</td>
</tr>
<tr>
<td>TiB</td>
<td>BLOCK</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>____</td>
<td>______</td>
<td>--------------------</td>
<td>--------</td>
<td>----------</td>
</tr>
</tbody>
</table>

6. Add the metadata storage disks to the active tier:

```bash
# storage add tier active dev<n>
```

7. Create and enable the file system:

```bash
# filesys create
# filesys enable
```

8. DDVE requires reliable time synchronization for object store communication. DDVE can synchronize time by using Amazon Time Sync Service or by configuring an NTP server.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method 1 - Using Amazon Time Sync</td>
<td>By default, DDVE uses Amazon Time Sync Service for time synchronization through a chrony client. DDVE does not require Internet access or configuration of security group rules to use</td>
</tr>
</tbody>
</table>
### Option | Service (recommended) | Description
--- | --- | ---
**Method 2 - Configuring NTP server** | To override the default, you can configure an NTP server by running these commands:  
- `ntp add timeserver 0.amazon.pool.ntp.org`
- `ntp enable`
- `ntp sync`

**Note:** `ntp disable` switches to the default time synchronization option (Amazon Time Sync Service).

### Results

The DDVE configuration is complete.

### Configure the DDVE manually

This section describes how to manually configure the DDVE, e.g., updating elicense, setting the system passphrase, enabling the object-store feature and setting the object-store profile. These steps can be executed if the configuration wizard was skipped or at any point after the initial configuration.

#### Procedure

1. Add the license by placing the license file under `/ddr/var/license`. Run the command `elicense update license.lic`

   **Note:** If the license file cannot be found in `/ddr/var` its content can be pasted directly on the console.

   ```
   # elicense update license.lic
   Existing licenses:
   |
   ---|---|---|---|---
   Capacity licenses:
   Date| Feature| Capacity| Type| State| Expiration  
---|-------|--------|-----|------|------------
1    | CAPACITY| 0.45 TiB| exp| active| n/a        
---|-------|--------|-----|------|------------
Feature licenses:
## Feature| Count| Type| State
---|-----|-----|-----
1    | REPLICATION| 1   | exp| active| n/a        
2    | DDBOOST| 1    | exp| active| n/a        
3    | RETENTION-LOCK-GOVERNANCE| 1   | exp| active| n/a        
4    | ENCRYPTION| 1   | exp| active| n/a        
---|-----|-----|-----
New licenses:
Capacity licenses:

<table>
<thead>
<tr>
<th>Feature</th>
<th>Capacity</th>
<th>Type</th>
<th>State</th>
<th>Expiration Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Note</td>
<td>---</td>
<td>---</td>
<td>-----</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>----</td>
<td>---</td>
<td>-----</td>
<td>---</td>
</tr>
<tr>
<td>1</td>
<td>CAPACITY</td>
<td>87.31 TiB</td>
<td>permanent (int)</td>
<td>active</td>
</tr>
<tr>
<td>Note</td>
<td>---</td>
<td>---</td>
<td>-----</td>
<td>---</td>
</tr>
</tbody>
</table>

Feature licenses:

<table>
<thead>
<tr>
<th>Feature</th>
<th>Count</th>
<th>Type</th>
<th>State</th>
<th>Expiration Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Note</td>
<td>---</td>
<td>---</td>
<td>-----</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>----</td>
<td>---</td>
<td>-----</td>
<td>---</td>
</tr>
<tr>
<td>1</td>
<td>DDBOOST</td>
<td>1</td>
<td>permanent (int)</td>
<td>active</td>
</tr>
<tr>
<td>Note</td>
<td>---</td>
<td>---</td>
<td>-----</td>
<td>---</td>
</tr>
<tr>
<td>2</td>
<td>ENCRYPTION</td>
<td>1</td>
<td>permanent (int)</td>
<td>active</td>
</tr>
<tr>
<td>Note</td>
<td>---</td>
<td>---</td>
<td>-----</td>
<td>---</td>
</tr>
<tr>
<td>3</td>
<td>REPLICATION</td>
<td>1</td>
<td>permanent (int)</td>
<td>active</td>
</tr>
</tbody>
</table>

** New license(s) will overwrite all existing license(s).
Do you want to proceed? (yes|no) [yes]: yes

eLicense(s) updated.

2. Set the system passphrase by running the command `system passphrase set`.

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

3. Enable object store using the command `storage object-store enable`.

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

4. Run the following command to create/modify the cloud profile: `# storage object-store profile set`. Enter the bucket name and import the Baltimore CyberTrust Root certificate to communicate with the object store.

```
# 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>
Do you want to use the FIPS 140-2 endpoint (yes|no) [no]: no
Object-store endpoint needs the Baltimore CyberTrust Root certificate to be imported.
Do you want to import that certificate with below fingerprint?
```
Recovering DDVE with system headswap

The system headswap command recovers DDVE with head unit failure in AWS.

**Before you begin**

Ensure that vNVRAM disk and Metadata disks from system A (original system) are available. These disks will be attached to the new instance B. If either vNVRAM disk or any metadata disk is not available, use the system recovery from object-store command instead.

**Procedure**

1. Create instance B with Head Unit (root disk only) with the same instance type as instance A.
2. Attach the same role to instance B as that of instance A.
3. On instance A, make a note of the vNVRAM disk name (usually `sdb`). Use the same name when attaching the vNVRAM disk to instance B.
4. Detach the vNVRAM and metadata disks from the failed head unit.
5. Attach the vNVRAM disk to instance B. While attaching the vNVRAM disk, ensure that the name of the disk on instance B is same as that on instance A.
1. **Note:** Ensure that the vNVRAM disk is attached before attaching the metadata disks.

6. Attach the metadata disks to instance B.

7. Set the system passphrase.

   **Note:** Set the passphrase to match system A, otherwise, the headswap fails.

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

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

9. Execute system headswap.

   **Note:** The 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!
   ```

10. Verify the file system status after the headswap process completes.

    ```
    # filesys status
    The filesystem is enabled and running.
    ```

   **Note:**
   - You may need to re-activate the license on the new instance if an unserved-mode license is used.
   - The CLI elicense check-out and elicense check-in are used to obtain licenses from the DDVE.
     - If you experience an invalid key magic issue after a headswap, set the passphrase on the new DDVE system, and then perform the headswap `ddboost user revoke token-access sysadmin command`.
     - If the DDVE 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 regenerates the certificate and imports it to DD.
Recovering the system

The system recovery command recovers the DDVE system with head unit, vNVRAM disk, and metadata disk after a failure of one or more of these components.

About this task

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, and role.

2. Enable object-store:

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

3. Set object-store profile:

   a. Set the passphrase to match system A, otherwise, the recovery fails 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
   DDVE 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?
   (yes|no) [yes]:
   Profile is set.
   ```

   c. Follow the rest of the 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
   Checking storage requirements...done
   Adding dev3 to the active tier...done
   Updating system information...done
   dev3 successfully added to the active tier.
   ```

5. Run the system recovery precheck:

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

6. Run the recovery:

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

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

⚠️ **Note:** The system reboots during the recovery process.

8. Check that the filesys status after the recovery process completes:

```bash
# filesys status
The filesystem is enabled and running.
```
Completing Initial DDVE Configuration
CHAPTER 5
Administering DDVE

This chapter includes the following topics:

- Upgrade from M4 to M5 instance type ................................................................. 46
- Upgrading M5 instance type .................................................................................. 46
- Adding virtual storage ......................................................................................... 47
- Extensions to DDOS for DDVE ............................................................................. 47
- DDVE-only commands ......................................................................................... 48
- Modified DD OS commands ............................................................................... 49
- Unsupported DD OS commands ......................................................................... 52
- Troubleshooting performance issues ................................................................... 57
Upgrade from M4 to M5 instance type

To benefit from performance improvements, you can upgrade an M4 instance type to the next generation M5 instance type.

**Before you begin**

Ensure that:

- DDOS version is 7.2 or later. If the DDOS version is older, upgrade the DDOS version. Run the `system show version` command to check the DDOS version on the DDVE.
- The DDOS upgrade is successful.

**Procedure**

1. To ensure a clean file system shutdown, run the `system poweroff` command.
2. From the AWS management console, change the instance type to one with the same or higher capacity.

<table>
<thead>
<tr>
<th>Capacity (TB)</th>
<th>vCPU #, memory (GiB)</th>
<th>M4 instance type</th>
<th>M5 instance type</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>4, 16</td>
<td>m4.xlarge</td>
<td>m5.xlarge</td>
</tr>
<tr>
<td>32</td>
<td>8, 32</td>
<td>m4.2xlarge</td>
<td>m5.2xlarge</td>
</tr>
<tr>
<td>96</td>
<td>16, 64</td>
<td>m4.xlarge</td>
<td>m5.4xlarge</td>
</tr>
</tbody>
</table>

**Note:** Alternatively, you can change the instance type with this command:

```
aws ec2 modify-instance-attribute --instance-id <instance-id> --instance-type "{"Value": "<M5 instance type>"}"
```

For example:

```
aws ec2 modify-instance-attribute --instance-id i-03abf8df1da1bf061 --instance-type "{"Value": "m5.4xlarge"}"
```

3. Enable the ena attribute by using this AWS command:

```
aws ec2 modify-instance-attribute --instance-id <instance_id> --ena-support
```

4. To verify that ena support is enabled for the instance, run this AWS command:

```
aws ec2 describe-instances --instance-ids <instance_id> --query "Reservations[].Instances[].EnaSupport"
```

5. From the AWS management console, power on the DDVE.

6. On the DDVE, verify that the system is up, and ensure that the file system status is enabled and running.

7. To confirm that the instance type is an M5 instance type, run the `system vresource show current` command:

**Upgrading M5 instance type**

**About this task**

You can upgrade the DDVE instance from `m5.xlarge > m5.2xlarge > m5.4xlarge`. 

---

**Administering DDVE**

46

**PowerProtect DD Virtual Edition on Amazon Web Services Installation and Administration Guide**
Procedure

1. Power off the system using the `system poweroff` command.
   From the AWS console, check that the DDVE instance is in the stopped state.

2. Select Action > Instance Settings > Change Instance Type.

3. Select the new instance type and click Apply.

4. Power on the DDVE from the AWS console.

5. Once the DDVE is powered on, run the command `system vresource show` to verify the new instance configuration.

Adding virtual storage

Attach new metadata disks to the instance from the AWS console before adding them on the DDVE. [Attaching an Amazon EBS Volume to an Instance](link) provides additional information.

More virtual storage can be added to the DDVE using the GUI or the CLI.

Using the GUI

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

Using the CLI

Run the `storage add dev <n>` command to add the disk to the DDVE.

When you add a new virtual data disk to an existing DDOS file system, use the `filesystems expand` command instead of the `filesystems create` command.

Configuring spindle groups

Do not manually configure any spindle groups. All spindle group configuration is done automatically.

Extensions to DDOS for DDVE

Several DDOS commands are supported on the DDVE platform only. This section describes these commands.

**perf**

Collect and show DDVE 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 DDVE.

```
system vresource show [current | requirements]
```

<table>
<thead>
<tr>
<th>Active Tier</th>
<th>Cloud Tier</th>
<th>Capacity (TB)</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>n/a</td>
<td>n/a</td>
<td>16</td>
<td>m5.xlarge</td>
</tr>
<tr>
<td>n/a</td>
<td>n/a</td>
<td>32</td>
<td>m5.2xlarge</td>
</tr>
<tr>
<td>n/a</td>
<td>n/a</td>
<td>96</td>
<td>m5.4xlarge</td>
</tr>
</tbody>
</table>

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

### DDVE-only commands

The following commands only work on DDVE and are not supported on physical DD systems.

**Table 4 DDVE-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>
</tbody>
</table>
| elicense checkout capacity-license <feature-name> value <n> {TB|GB} | Allows user to check out the capacity of licenses for License Server installation. Here is sample output:
sysadmin@localhost# elic checkout capacity-license capacity value 10 TB Checking out CAPACITY license will also checkout available 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 REPLICAATION, DDBOOST, ENCRYPTION. Total 10 TB CAPACITY license is now available on this system. |
Table 4 DDVE-only commands (continued)

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>elicense checkin {&lt;feature-name-list&gt;</td>
<td>all}</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>Returns DDVE to factory license settings.</td>
</tr>
<tr>
<td>elicense license-server show</td>
<td></td>
</tr>
<tr>
<td>filesystem show space tier active local-metadata</td>
<td>Displays the usage for the metadata storage. <strong>Note:</strong> Some portion of the disk space is reserved for internal metadata, such as index. The amount of space is based on the maximum capacity of the platform and not on licensed capacity.</td>
</tr>
<tr>
<td>net hosts add</td>
<td>Two DDVEs in different regions cannot resolve each other’s hostname. Run this command to add a host list entry. <strong>Note:</strong> For VNET to VNET connection between different regions in Azure, see Microsoft.com.</td>
</tr>
<tr>
<td>storage object-store enable</td>
<td>Enables the object-store feature for DDVE.</td>
</tr>
<tr>
<td>storage object-store disable</td>
<td>Disables the object-store feature for DDVE.</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>This CLI lists the object-store profile information set on the DDVE.</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 DDVE instance. The requirements option displays the physical storage requirements for DDVE.</td>
</tr>
</tbody>
</table>

Modified DD OS commands

The behavior of the following commands is modified on the DDVE platform:

Table 5 Modified DD OS commands

<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>Command</td>
<td>Changes</td>
</tr>
<tr>
<td>---------</td>
<td>---------</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 DDVE have been removed.</td>
</tr>
<tr>
<td>ddboost clients show active</td>
<td>The tenant-unit parameter is not supported.</td>
</tr>
<tr>
<td>ddboost file-replication show active</td>
<td>The tenant-unit parameter is not supported.</td>
</tr>
<tr>
<td>ddboost file-replication show detailed-file-history</td>
<td>The tenant-unit parameter is not supported.</td>
</tr>
<tr>
<td>ddboost file-replication show file-history</td>
<td>The tenant-unit parameter is not supported.</td>
</tr>
<tr>
<td>ddboost option reset</td>
<td>The fc parameter is not supported.</td>
</tr>
<tr>
<td>ddboost option show</td>
<td>The fc parameter is not supported.</td>
</tr>
<tr>
<td>ddboost storage-unit create</td>
<td>The tenant-unit parameter is not supported.</td>
</tr>
<tr>
<td>ddboost storage-unit modify</td>
<td>The tenant-unit parameter is not supported.</td>
</tr>
<tr>
<td>ddboost storage-unit show</td>
<td>The tenant-unit parameter is not supported.</td>
</tr>
<tr>
<td>ddboost streams show active</td>
<td>The tenant-unit parameter is not supported.</td>
</tr>
<tr>
<td>ddboost 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>DDVE system disks show the System Dev state.</td>
</tr>
<tr>
<td>disk show stats</td>
<td>The DDVE 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>
<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>
</tbody>
</table>
### Table 5  Modified DD OS commands (continued)

<table>
<thead>
<tr>
<th>Command</th>
<th>Changes</th>
</tr>
</thead>
<tbody>
<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 DDVE 5.0. Retention lock governance mode is supported for DDVE on premises. Retention lock compliance mode is not supported for any DDVE.</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>
<tr>
<td>perf</td>
<td>The vtl option is not supported on any perf command.</td>
</tr>
<tr>
<td>storage add</td>
<td>The enclosure and disk parameters are not supported.</td>
</tr>
<tr>
<td>storage remove</td>
<td>The enclosure and disk parameters are not supported.</td>
</tr>
<tr>
<td>storage show</td>
<td>The archive option is not supported.</td>
</tr>
</tbody>
</table>
### Table 5 Modified DD OS commands (continued)

<table>
<thead>
<tr>
<th>Command</th>
<th>Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>system show stats</td>
<td>NVRAM statistics are not reported, because DDVE systems do not have physical NVRAM.</td>
</tr>
<tr>
<td>quota</td>
<td>The <code>tenant-unit</code> parameter is not supported.</td>
</tr>
<tr>
<td>replication</td>
<td>MTree replication is the only type of replication supported.</td>
</tr>
<tr>
<td>snapshot</td>
<td>The <code>tenant-unit</code> parameter is not supported.</td>
</tr>
</tbody>
</table>

### Unsupported DD OS commands

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

### Table 6 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 tenant-alert-summary {enabled</td>
<td>disabled}</td>
</tr>
<tr>
<td>alerts notify-list option reset group-name tenant-alert-summary</td>
<td>Deprecated. Use <code>alerts notify-list reset</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></td>
</tr>
<tr>
<td>autosupport display</td>
<td>Deprecated. Use <code>autosupport show report</code> instead.</td>
</tr>
<tr>
<td>autosupport reset support-list</td>
<td>Deprecated. Use `autosupport reset { all</td>
</tr>
<tr>
<td>autosupport show 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>Unsupported command or command option</td>
<td>Notes</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>cluster</td>
<td></td>
</tr>
<tr>
<td>ddboost fc</td>
<td></td>
</tr>
<tr>
<td>ddboost option reset fc</td>
<td></td>
</tr>
<tr>
<td>ddboost option set distributed-segment-processing disabled</td>
<td>Turning off distributed segment processing (DSP) with this DDBoost command is not supported for DDVE on DD OS 6.1.2.x.</td>
</tr>
<tr>
<td>ddboost option show</td>
<td>Turning off DSP with this DDBoost command is not supported for DDVE on DD OS 6.1.2.x.</td>
</tr>
<tr>
<td>ddboost option show fc</td>
<td></td>
</tr>
<tr>
<td>ddboost show image-duplication</td>
<td>Deprecated. Use <code>ddboost file-replication show</code> instead.</td>
</tr>
<tr>
<td>ddboost user option set user default-tenant-unit tenant-unit</td>
<td></td>
</tr>
<tr>
<td>ddboost user option reset user [default-tenant-unit]</td>
<td></td>
</tr>
<tr>
<td>disk add dev disk-id [spindle-group 1-16]</td>
<td>Deprecated. Use <code>storage add</code> instead.</td>
</tr>
<tr>
<td>disk add enclosure enclosure-id</td>
<td>Deprecated. Use <code>storage add</code> 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 <code>storage add</code> 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 <code>disk show state</code> and <code>storage show</code> 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 <code>disk show state</code> and <code>storage show</code> 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 unfail</td>
<td></td>
</tr>
<tr>
<td>enclosure beacon</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 all [enclosure]</td>
<td>This command is supported, but not with the <code>enclosure</code> 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 <code>enclosure</code> argument.</td>
</tr>
<tr>
<td>enclosure show cpus [enclosure]</td>
<td>This command is supported, but not with the <code>enclosure</code> 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 <code>enclosure</code> argument.</td>
</tr>
<tr>
<td>enclosure show memory [enclosure]</td>
<td>This command is supported, but not with the <code>enclosure</code> argument.</td>
</tr>
<tr>
<td>enclosure show nvram</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>fileys archive</td>
<td></td>
</tr>
<tr>
<td>fileys clean update-stats</td>
<td>Deprecated. Use fileys show space instead.</td>
</tr>
<tr>
<td>fileys encryption</td>
<td></td>
</tr>
<tr>
<td>fileys encryption passphrase change</td>
<td>Deprecated. Use system passphrase change instead.</td>
</tr>
<tr>
<td>fileys retention-lock</td>
<td>Deprecated. Use mtree retention-lock instead.</td>
</tr>
<tr>
<td>fileys show compression tier</td>
<td>The <code>tier</code> option is not supported.</td>
</tr>
<tr>
<td>fileys show history</td>
<td>Deprecated. Use fileys show compression daily 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 DDVE uses new <code>elicense</code> commands.</td>
</tr>
<tr>
<td>mtree show compression mtree_path tier</td>
<td></td>
</tr>
</tbody>
</table>
### Table 6 Unsupported commands and command options (continued)

<table>
<thead>
<tr>
<th>Unsupported command or command option</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<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>failover</td>
</tr>
<tr>
<td>net set portnaming</td>
<td></td>
</tr>
<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 option</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 time every mins [retention period]</td>
<td>Deprecated. Use snapshot schedule create instead.</td>
</tr>
</tbody>
</table>
Table 6 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 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>
<tr>
<td>snapshot show schedule</td>
<td>Deprecated. Use snapshot schedule show 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 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>
</tbody>
</table>
### Table 6 Unsupported commands and command options (continued)

<table>
<thead>
<tr>
<th>Unsupported command or command option</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<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 vtl group instead.</td>
</tr>
<tr>
<td>vtl lunmask add</td>
<td>Deprecated. Use vtl group add instead.</td>
</tr>
<tr>
<td>vtl lunmask del</td>
<td>Deprecated.</td>
</tr>
<tr>
<td>vtl lunmask show</td>
<td>Deprecated. Use vtl group show instead.</td>
</tr>
</tbody>
</table>

### Troubleshooting performance issues

You can check DDVE performance statistics as follows:
- With native tools in AWS
You can also use the following to monitor benchmark performance:
- `perf`

*Extensions to DDOS for DDVE* on page 47 provides more 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

- Memory swapping—The key statistic for memory performance, which is 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.
APPENDIX A

Best Practices for Working with DDVE in the Cloud

This chapter includes the following topics:

- ASUP configuration ................................................................. 60
- AWS licensing ........................................................................ 60
- Storage best practices ........................................................... 60
- Security best practices ............................................................ 62
**ASUP configuration**

We recommend enabling AutoSupport (ASUP) in DDVE. Although Experience, Secure Remote Services (ESRS) is not yet supported in AWS, you can use the email transfer server to transfer ASUP files.

**About this task**

Set up the following items to ensure that ASUPs and alert emails from the DDVE instance are sent to Dell EMC.

1. **Administrator**: Specify a password and email address for the administrator.
2. **Email/location**: Specify the mail server to use to send outgoing alert and ASUPs to recipients. Recipients are subscribers to groups. A default group is created that contains the email addresses of the administrator and a Dell EMC email address, autosupportalert@autosupport.datadomain.com. The location field is for information only.
3. **Review the summary carefully**: The default email address for alerts and autosupport emails is autosupportalert@autosupport.datadomain.com. A detailed autosupport and an alert summary are scheduled to run daily at 6:00 AM system time.

**AWS licensing**

The DDVE license is node locked which means the same license cannot be used on multiple DDVE instances. To facilitate DDVE license management, we recommend using served-mode licenses if multiple DDVEs are to be deployed.

**Note:**
- The DDVE license might become invalid after removing the first NIC ethV0.
- In the case of a head swap, the license will continue to work on new DDVE instance if served-mode licenses are used, otherwise you need to re-activate the license.
- You may create a new DDVE instance from an AWS snapshot. The license is automatically checked out from the license server on the new instance if served-mode licenses are used, as long as the license server has sufficient licenses for this new instance to check out. Otherwise you need to re-activate the license.

**Storage best practices**

**Use the appropriate storage type**

Use GP2 EBS volumes for the root disk, NVRAM disk, and metadata disks.

**Object storage specifications**

The following table lists the supported instance types and their storage configuration for object storage.

Metadata disk storage is recommended to be 10% of the total capacity. Each metadata disk is recommended to be 1 TiB.
Table 7 Storage size specifications

<table>
<thead>
<tr>
<th>DDVE configuration</th>
<th>Instance type</th>
<th>Root disk (GP2)</th>
<th>NVRAM disk (GP2)</th>
<th>Metadata disk (GP2)</th>
<th>Metadata disks required</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 TB</td>
<td>M5.xlarge</td>
<td>250 GiB</td>
<td>10 GiB</td>
<td>1024 GiB</td>
<td>1-2</td>
</tr>
<tr>
<td>32 TB</td>
<td>M5.2xlarge</td>
<td>250 GiB</td>
<td>10 GiB</td>
<td>1024 GiB</td>
<td>1-4</td>
</tr>
<tr>
<td>96 TB</td>
<td>M5.4xlarge</td>
<td>250 GiB</td>
<td>10 GiB</td>
<td>1024 GiB</td>
<td>1-10</td>
</tr>
</tbody>
</table>

**Note:**
- If the incorrect instance type is used, the system displays an alert for an unsupported virtual hardware configuration.
- The metadata requirements that are listed above are based on a 10x deduplication ratio and a 2x compression ratio. For workloads with a higher deduplication ratio, more metadata storage is required.

Block storage specifications

The following table lists the instance types and storage types that are required for block storage.

Table 8 Storage configuration types for DDVE in AWS (block store)

<table>
<thead>
<tr>
<th>DDVE configuration</th>
<th>Instance type</th>
<th>Root disk type/size</th>
<th>NVRAM disk type/size</th>
<th>Data disk type/size</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 TB</td>
<td>M5.xlarge</td>
<td>GP2/250 GB</td>
<td>GP2/10 GB</td>
<td>GP2/1024 GB</td>
</tr>
</tbody>
</table>

**Note:**
- DDVE with block storage supports a maximum capacity of 16 TB. The recommended size of each data disk is one TiB.
- If the incorrect instance type is used, the system displays an alert for an incorrect virtual hardware configuration.

Table 9 Supported stream counts

<table>
<thead>
<tr>
<th>System capacity</th>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Stream counts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Read</td>
</tr>
<tr>
<td>16 TB</td>
<td>M5.xlarge</td>
<td>4</td>
<td>16</td>
<td>30</td>
</tr>
<tr>
<td>32 TB</td>
<td>M5.2xlarge</td>
<td>8</td>
<td>32</td>
<td>50</td>
</tr>
<tr>
<td>96 TB</td>
<td>M5.4xlarge</td>
<td>16</td>
<td>64</td>
<td>50</td>
</tr>
</tbody>
</table>

Metadata disk storage expansion notes

Dell EMC recommends to use 10% of the system capacity as the metadata storage, where each metadata disk size is one TiB. This metadata storage recommendation is based on 10X deduplication ratio and 2X compression. For workloads with a higher deduplication ratio, more metadata storage may be required. If metadata storage usage exceeds 80%, an alert is generated. Add a metadata disk to the DDVE immediately to avoid running out of space.
The *DD OS Administration Guide* provides a procedure for expanding storage. Dell EMC recommends that you always use 1 TiB metadata disks.

**Spindle group**
You are not required to specify a spindle group when adding metadata disks. The spindle group assignment is balanced automatically when adding storage. Do not set or change the spindle group settings manually. Run the `storage show all` command to verify that each data volume is assigned to a different spindle group.

**Object storage bucket configuration notes**
- The bucket that is provided during file system creation must be empty, otherwise file system creation fails.
- When the file system is destroyed, the associated bucket and the objects it contains are not automatically deleted or removed. The bucket must be intentionally deleted to avoid incurring the cost for the content stored in the bucket.
- Do not enable S3 versioning on the bucket. Doing so incurs additional cost because older versions of the objects are retained, although they are removed by the GC cycles.
- Do not configure any life-cycle policy on the bucket as it might result in loss of critical data.

**Converting from evaluation to production**
Rather than convert an evaluation version of DDVE to a production version, Dell EMC recommends a fresh deployment. If you decide to convert from an evaluation version to production version, Dell EMC recommends that you:
- Destroy the existing file system
- Delete any small data disk (not the root or NVRAM disks)
- Configure new disks according to the recommendations in this guide

**Security best practices**

**Avoid Public IP address**
To prevent brute force attacks on the DDVE, it must not be configured with a public IP address.

**Secure access**
The following table illustrates the different authentication methods that are supported by DDVE.

<table>
<thead>
<tr>
<th>Access Type</th>
<th>Authentication Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>GUI</td>
<td>username/password X509 certificates</td>
</tr>
<tr>
<td>SSH</td>
<td>username/password</td>
</tr>
<tr>
<td></td>
<td>SSH key pair</td>
</tr>
<tr>
<td>REST API</td>
<td>username/password X509 certificates</td>
</tr>
</tbody>
</table>

For better security, we recommend you disable the username/password based user authentication. If the username/password based authentication is desired, we recommend that you configure a stronger password.

**Note:** Password based login should not be disabled if you want to configure Avamar Virtual Edition, NetWorker, or other backup software to connect to DDVE in AWS, because password authentication is used for communication between them.
Because AWS is a public cloud, pay attention to the security in your deployment. We suggest these best practices:

- Use public key based authentication for SSH access
- Use certificate based authentication for DDSM access
- Do not configure public IP for DDVE in AWS, if possible
- Use external KMIP server to store encryption keys
- Enable encryption for DDFS and replication

After a DDVE deployment from the market place, DDVE SSH login with a username and password is enabled. The default password for the sysadmin user is the EC2 instance ID of the DDVE instance. At the first login, a password change is required. The EC2 key access pair associated with the sysadmin user is an optional alternative to username and password authentication.

**IP Tables feature**

After protecting the DDVE using secure setup, within the DDVE you can filter the network traffic that enters by using the `iptables` feature. For more configuration information, see the DD OS 6.2 Command Reference Guide's Net Filter section.

**Security rules settings**

Since the DDVE in AWS is always running in a VPC, the VPC should be configured so that only required and trusted clients have access to the DD system. The following tables show the TCP and UDP ports that are used by the DD system for inbound and outbound traffic, and which service makes use of them. Consider the following information when configuring VPC firewall rules. For additional information, see Amazon EC2 Security Groups for Linux Instances.

**Inbound rules**

The following are the inbound ports used by DDVE.

**Table 11 Inbound ports used by DDVE**

<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 DDVE.</td>
</tr>
<tr>
<td>TCP 443</td>
<td>HTTPS</td>
<td>Used for DDSM (GUI) access and for configuring DDVE.</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> command on DD 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 DDSM. This port cannot be modified. This port will also need to be opened if you plan to configure replication from within the DDSM, since the replication partner needs to be added to the DDSM.</td>
</tr>
</tbody>
</table>

Depending on the protocol that is used to backup data to DDVE, additional ports are enabled with inbound firewall rules.
Outbound rules

The following are the outbound ports that are used by DDVE.

Table 12 Outboard ports used by DDVE

<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 DD system to synchronize to a time server.</td>
</tr>
<tr>
<td>TCP 443</td>
<td>HTTPS</td>
<td>Used for DDVE to be able to communicate with outside services.</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/</td>
<td>Used only if replication is configured (run <code>replication show config</code> on DD system to determine). This port can be modified using <code>replication modify</code>.</td>
</tr>
<tr>
<td></td>
<td>Optimized Duplication</td>
<td></td>
</tr>
<tr>
<td>TCP 2051</td>
<td>SMS (system management)</td>
<td>Used for managing a system remotely using DDSM. This port cannot be modified. This port will also need to be opened if you plan to configure replication from within the DDSM, as the replication partner needs to be added to the DDSM.</td>
</tr>
</tbody>
</table>

Depending on the other applications/services that are being used, additional ports shall be enabled for outbound firewall rules.
APPENDIX B

Networking Best Practices for DDVE in the Cloud

This chapter includes the following topics:

- Network setup in AWS .......................................................... 66
- Network infrastructure setup .................................................. 67
Network setup in AWS

VPC Architecture
We recommend you use public or private subnet architecture to deploy the DDVE in private subnet. It will secure the DDVEs (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 DDVE from potential attacks over open internet, the DDVE 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 DDVE 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 DDVE 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 DDVE 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 DDVE 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 DDVE to access the S3 bucket securely.
The S3 bucket that was created for DDVE use, MUST be in the same region where DDVE is running.

For information see Amazon AWS documentation.

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 DDVE.

Table 13 DDVE Inbound Ports

<table>
<thead>
<tr>
<th>Port</th>
<th>Service</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCP 22</td>
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<tr>
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<td>DD Boost/NFS</td>
<td>Main port used by NFS - can be modified using the nfs set server-port 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 replication show config on DD system to determine). This port can be modified using replication modify.</td>
</tr>
<tr>
<td>TCP 3009</td>
<td>SMS (system management)</td>
<td>Used for managing a system remotely using DD System Manager. This port cannot be modified. This port is used only on DD 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 DD System Manager, as the replication partner needs to be added to the DD System Manager.</td>
</tr>
</tbody>
</table>

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

Outbound control

As stated earlier the security groups are stateful, which means that if a request is allowed to be sent out of a DDVE, its responses will be allowed regardless of inbound rules. The following are the outbound ports that shall be allowed for DDVE.
### Table 14 DDVE 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 DD system to synchronize to a time server.</td>
</tr>
<tr>
<td>TCP 443</td>
<td>HTTPS</td>
<td>Used for DDVE 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>
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<tr>
<td>TCP 2051</td>
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<td>Used for managing a system remotely using DD System Manager. This port cannot be modified. This port is used only on DD 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 DD System Manager, as the replication partner needs to be added to the DD System Manager.</td>
</tr>
</tbody>
</table>

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

Installing and Configuring DDVE on Block Storage in the Cloud

This chapter includes the following topics:

- Overview of DDVE on block storage ................................................................. 70
- Configuring DDVE on block storage with DD System Manager ..................... 70
Overview of DDVE on block storage

DDVE on block storage provides enterprise customers and service providers who are running applications in the public cloud with a deduplication data protection appliance that provides object storage efficiency and ease of management.

DDVE on block storage supports:

- Backup and restore using active tier data into cloud block storage while DDVE is running in the cloud.
- DD System Manager to configure, manage, and monitor DDVE on block storage.
- DD Management Center for multisystem management of DDVE systems in the cloud on block storage.

Configuring DDVE on block storage with DD System Manager

You can use the DD System Manager to configure DDVE as an active tier on a block storage system.

About this task

Use the Configuration wizard to configure the active tier and create the file system on the DDVE instance.

Procedure

1. Log in as sysadmin with the password Ec2<DDVE-instance-ID>.

2. To configure the active tier on block storage, ensure that the Enable Object Store checkbox is cleared and click Next.

3. Add the block storage attached to the DDVE 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. To view the space usage and availability details for the block storage, select Data Management > File System.

6. To configure or update the eLicense on the DDVE instance, select Licenses > Replace Licenses.

7. To relaunch the configuration wizard, select Maintenance > Configure System > Configure System.