

PowerProtect DD Virtual Edition on Premises

Version DDVE 4.0

Installation and Administration Guide

REV 05

March 2020

Copyright © 2016-2020 Dell Inc. or its subsidiaries. All rights reserved.

Dell believes the information in this publication is accurate as of its publication date. The information is subject to change without notice.

THE INFORMATION IN THIS PUBLICATION IS PROVIDED “AS-IS.” DELL MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WITH RESPECT TO THE INFORMATION IN THIS PUBLICATION, AND SPECIFICALLY DISCLAIMS IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. USE, COPYING, AND DISTRIBUTION OF ANY DELL SOFTWARE DESCRIBED IN THIS PUBLICATION REQUIRES AN APPLICABLE SOFTWARE LICENSE.

Dell Technologies, Dell, EMC, Dell EMC and other trademarks are trademarks of Dell Inc. or its subsidiaries. Other trademarks may be the property of their respective owners. Published in the USA.

Dell EMC
Hopkinton, Massachusetts 01748-9103
1-508-435-1000 In North America 1-866-464-7381
www.DellEMC.com

CONTENTS

	Revision history	5
	Preface	7
Chapter 1	Introducing DDVE	9
	Introducing DDVE.....	10
	DDVE features	10
Chapter 2	Deploying DDVE	13
	Managing DDVE	14
	Supported virtual environments.....	14
	Provisioning physical storage.....	14
	Raw physical storage capacity requirements	15
	Managing SSD cache tiers.....	15
	SSD cache tier requirements.....	16
	Best practices and limitations for cache tier storage.....	16
	SSD cache tier considerations.....	16
	Using the DAT tool to meet IOPS requirements for the SSD cache tier... 17	
	Using the DD System Manager to manage SSD cache tiers.....	18
	Using the CLI to manage SSD cache tiers.....	18
	Configuration requirements for DD Cloud Tier support	19
	Installing DDVE on premises.....	20
	Downloading the DDVE software	20
	Installing DDVE on a VMware ESXi Server.....	21
	Installing DDVE on a VMware vCenter Server.....	21
	Installing DDVE in a Microsoft environment.....	22
	Installing the DDVE on Hyper-V using the GUI.....	25
	Configuring the DDVE on Hyper-V using the GUI.....	25
	Initial virtual machine configuration.....	27
	Upgrading DD OS for DDVE.....	28
	Powering on the virtual machine	29
	Defining the DD system information for your site	29
	Deploying DDVE on KVM hypervisor.....	31
	Configuring other resources for DDVE on KVM.....	31
	Deploying the DDVE on the KVM Hypervisor.....	32
	Deploying DDVE on KVM using a reference script.....	32
	Deploying the DDVE on KVM using the Virtual Machine Manager.....	34
	Best Practices for deploying the DDVE on a KVM hypervisor	35
Chapter 3	Completing Initial DDVE Configuration	37
	Initial System Configuration	38
	DDVE storage guidelines.....	38
	Configuring DDVE in DD System Manager.....	39
	Provisioning the storage with the CLI.....	42
	Configuring the system for data access	44

	Monitoring performance.....	44
	Configuring other resources	44
	Configuring optional software and internal licenses.....	46
	Configuring optional system settings	46
Chapter 4	Administering DDVE	49
	Adding virtual storage	50
	Extensions to DDOS for DDVE.....	50
	Storage performance evaluation.....	50
	perf.....	52
	system vresource.....	52
	DDVE-only commands.....	53
	Modified DD OS commands.....	54
	Unsupported DD OS commands	57
	Troubleshooting performance issues.....	62

Revision history

Table 1 DDVE 4.0 On Premises Installation and Administration Guide revision history

Revision	Date	Description
05	March 2020	Editorial updates
04	January 2020	Editorial updates
03	September 2019	Editorial updates
02	March 2019	Editorial updates
01	December 2018	Initial Publication (with DD OS 6.2.0.5)

Preface

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.
- *Avamar, DD and NetWorker Compatibility Guide*: <http://compatibilityguide.emc.com:8080/CompGuideApp/>
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>.

Technical support

For technical support of this release of DDVE, go to Online Support at <https://support.emc.com>.

Your comments

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

CHAPTER 1

Introducing DDVE

This chapter includes the following topics:

- [Introducing DDVE](#)..... 10
- [DDVE features](#) 10

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 features

Resource configurations depend on your DDVE configuration. For features for cloud configurations within the admin guide for your specific cloud provider, see .

- Up to 500 GB (evaluation version only)
- Up to 8 TB
- Up to 16 TB
- Up to 32 TB
- Up to 48 TB
- Up to 64 TB
- Up to 96 TB

DDVE capacity is available in 1 TB increments starting at 1 TB, and up to 96 TB. The following sections list supported DD protocols and features in DDVE.

Supported DD protocols

- CIFS
- NFS
- DD Boost (DD Boost) over IP
- DD Boost (DD Boost) FS

Supported DD features

- DD Boost managed file replication (MFR)
- Encryption
- DD System Manager GUI for DDVE management
- Secure multitenancy (SMT) with Network Isolation Support in 6.0
- DD Cloud Tier (supported in 16 TB, 64 TB, and 96 TB configurations)
- Hadoop Application Agent
- KMIP
- More restricted IPtables settings
- Managed file replication and MTree replication
- Instant access (supported on 16 TB and larger configurations only)
- Retention Lock Governance Edition is supported on DDVE (both on premises and in the cloud)

The *DD OS Administration Guide*, *DD Boost OST Guide*, and *DD Boost for Partner Integration Administration Guide* provide additional information about the supported protocols and features.

Unsupported DD features

- DD Boost over FC
- Extended retention
- DD High Availability (HA)--however, VMware and Hyper-V HA are supported
- NDMP
- VTL
- Collection replication
- Directory replication
- Instant access (not supported on configurations smaller than 16 TB)
- Retention Lock Compliance Edition
- Net aggregation

DD OS commands that are related to these unsupported features, and commands for hardware features that are not applicable to a virtual machine, are not supported on the DDVE platform.

CHAPTER 2

Deploying DDVE

This chapter includes the following topics:

- [Managing DDVE](#) 14
- [Supported virtual environments](#)..... 14
- [Provisioning physical storage](#)..... 14
- [Managing SSD cache tiers](#)..... 15
- [Configuration requirements for DD Cloud Tier support](#) 19
- [Installing DDVE on premises](#)..... 20
- [Defining the DD system information for your site](#) 29
- [Deploying DDVE on KVM hypervisor](#)..... 31
- [Configuring other resources for DDVE on KVM](#).....31
- [Deploying the DDVE on the KVM Hypervisor](#)..... 32

Managing DDVE

Use the VMware vSphere client software, the VMware vSphere Web client, or Hyper-V Manager to install a DDVE instance and define its virtual hardware, including CPUs, memory, network interfaces, and virtual disks.

The DD System Manager provides a configuration wizard to guide you through the steps required to configure DD OS after the virtual appliance is installed.

Once DDVE is configured and running, you can access the system console to run DD OS commands by using the VMware vSphere Web client or Hyper-V Manager. You can also administer the DDVE by using a terminal emulator or `ssh` command to use the CLI.

The default login credentials for the DDVE instance are:

- Username: sysadmin
- Password: changeme or the password specified during deployment

 **Note:** The system sends an alert if an RSA DPM client certificate is within 15 days of expiring.

Supported virtual environments

DDVE is supported in the following virtual environments:

- Microsoft Windows Server 2012 R2 with Hyper-V.
- KVM hypervisor on supported Linux distributions
- VMware ESXi servers, either standalone or managed by VMware vCenter, versions 5.5, 6.0, and 6.5 with the corresponding versions of the VMware vSphere client application.



 **Note:** DDVE supports virtual hardware versions of virtual machines up to the latest version of the ESXi in use, and minimum of version 10. Consult VMware latest documentation for any virtual hardware version upgrades.

Table 2 Supported Virtual Hardware

ESXi Version	Up to Virtual Hardware version
ESXi 6.5	13
ESXi 6.0	11
ESXi 5.5	10

 **Note:** The OpenVMTools are pre-installed on the DDVE image. When you update the DD OS software on the DDVE from within the DD OS environment, any necessary updates to the OpenVMTools are installed automatically. It is not possible to update OpenVMTools on the virtual machine from outside DD OS.

The hypervisor user needs read-only privileges on the data center object where the server or cluster hosting the DDVE instance resides.

For information about compatibility with VMware or Microsoft products, visit the support portal at <https://support.emc.com>.

Provisioning physical storage

You can provision storage on an ESXi or Windows Hyper-V server to host the DDVE instance.

Note: Ensure that the disks provisioned in VMware are configured as "Independent Persistent Disks."

Raw physical storage capacity requirements

The following table shows the raw storage capacity required to provide the net usable capacity. For raw capacities not listed, use the same raw capacity in TiB as the usable capacity.

For example:

- To net 40 TB usable capacity, provision 40 TiB.
- For 5 TB capacity with 8 TB configuration, provision 5 TiB.

Note: The capacity in vCenter or Hyper-V manager is listed in TiB. When you create a 1 TB virtual disk in vCenter, a storage capacity of 1 TiB is allocated.

This table does not apply to configurations with DD Cloud Tier.

Table 3 Raw physical capacity requirements

Usable Capacity (TB)	Raw Capacity (GiB) at each configuration					
	8	16	32	48	64	96
0.5	622	620	632	694	752	846
1	1116	1114	1126	1188	1245	1340
2	2101	2100	2112	2174	2232	2326
3	3072	3072	3098	3161	3218	3312
4	4096	4096	4096	4148	4205	4299
5	5120	5120	5120	5120	5191	5286
6	6144	6144	6144	6144	6144	6272
7	7168	7168	7168	7168	7168	7259
8		8192	8192	8192	8192	8245
9		9216	9216	9216	9216	9216

Table 4 Conversions for raw physical capacity

GiB	TB
1	0.001074
TB	GiB
1	0.909495

Managing SSD cache tiers

The SSD cache tier for DDVE systems uses flash technology to create cache tiers for file system metadata. The SSD cache is a low latency, high input/output operations per second (IOPS) cache to accelerate metadata and data access.

Note: The minimum software version required for HyperV and KVM is DD OS 6.2.x.x.

The SSD cache tier provides the SSD cache storage for the file system. Caching the file system metadata on SSDs improves I/O performance for both traditional and random workloads.

When the cache tier is first created, a file system restart is required if the cache tier is added when the file system is running. You can add cache to a live system without disabling the file system. If the file system does not exist or if the file system is not enabled, creating or enabling the file system after adding the cache tier activates the SSD cache.

Note:

- If encryption is enabled for the active tier, data cache and DM cache are not enabled.
- When the remaining number of spare blocks gets close to zero, the SSD enters a read-only condition. DD OS treats the drive as read-only cache and sends an alert.

SSD cache tier requirements

Review the SSD requirements for your specific DDVE model. Note that SSD cache tier is not supported for configurations less than 16 TB.

Table 5 Supported SSD models and requirements

DDVE Model	SSD Requirement
DDVE 16 TB	160 GB
DDVE 32 TB	320 GB
DDVE 48 TB	480 GB
DDVE 64 TB	640 GB
DDVE 96 TB	960 GB

Best practices and limitations for cache tier storage

You should be aware of the following best practices and limitations when adding storage to the cache tier:

- Adding storage to the cache tier requires a CAPACITY license in the system.
- Add only SSD type disks to the cache tier. If the device is not recognized as an SSD disk, use the `force` option in the `storage add tier cache` CLI command. For example, `storage add tier cache <dev> force`.
- You must add at least a 100 GB disk to the cache tier.
- If the tier is under provisioned when the file system is enabled, you must add the required cache capacity.
- If the tier is over provisioned, adding the cache tier storage fails.

SSD cache tier considerations

Be aware of the following best practices and limitations for SSD cache tiers:

- When the number of spare blocks remaining gets close to zero, the SSD enters a read-only condition and DD OS treats the drive as read-only cache and sends an alert.
- When SSDs are deployed within a controller, the SSDs are treated as internal root drives. They appear as enclosure 1 in the output of the `storage show all` command.

- You can manage individual SSDs with the `disk` command the same way HDDs are managed.
- You can run the `storage add tier cache` command to add an individual SSD or an SSD enclosure to the SSD cache tier.
- The SSD cache tier space is managed automatically. The file system draws the required storage from the SSD cache tier and shares it among its clients.

Using the DAT tool to meet IOPS requirements for the SSD cache tier

Before you begin

We recommend that you run the DAT tool before you create a file system and after you add SSD to the cache tier.

About this task

Note: Running the DAT tool after you create the file system does not provide the expected results. If the disks are in use by the file system, DAT performs read-only test.

Procedure

1. Start an SSD cache benchmark test only.

In the following example, `dev3` is a cache disk on a 16 TB DDVE instance.

```
disk benchmark start cache dev3
This will take about 5 minutes to complete.
  Are you sure? (yes|no) [no]: yes

ok, proceeding.
Checking devices, please wait.
Benchmark test 1 started, use 'disk benchmark watch' to monitor its
progress.

Results:
disk benchmark show
Last benchmark test 1 was completed.
Devices:                dev3 dev3 dev3 dev3 dev3 dev3
Start Time:             2018/06/22 17:23:29
Duration (hh:mm:ss):   00:04:55

Cache Write   Cache Read   Cache Write   Cache Read
Random IOPS   Random IOPS   Random Latency (ms)   Random Latency (ms)
-----
                102           24092           6.75           0.98
-----

This set of devices is suitable for use in a 16 TiB file
system.
```

2. Start a test of the SSD cache test and the data disk.

In the following example, `dev3` is a cache disk and `dev4` and `dev5` are data disks on a 16 TB DDVE instance.

```
disk benchmark start dev4+dev5 cache dev3
This will take about 10 minutes to complete.
  Are you sure? (yes|no) [no]: yes

ok, proceeding.

Checking devices, please wait.
Benchmark test 30 started, use 'disk benchmark watch' to monitor its
progress.
```

```

Results:
disk benchmark show

Checking devices, please wait.
Benchmark test 30 was completed.
Devices:          dev4+dev5 dev3+dev3 dev3+dev3 dev3+dev3 dev3+dev3
dev3+dev3 dev3+dev3
Start Time:      2018/06/22 15:46:01
Duration (hh:mm:ss): 00:09:40

Sequential      Read Random      Read Random      vNVRAM
Throughput (MiB/s)  IOPS             Latency (ms)     Write
IOPS
-----
n/a              2322             1244             5.50
-----

Cache Write      Cache Read      Cache Write      Cache Read
Random IOPS      Random IOPS     Random Latency (ms)  Random Latency (ms)
-----
102              24544          6.79             0.99
-----

This set of devices is suitable for use in a 16 TiB file system.

```

Using the DD System Manager to manage SSD cache tiers

You can add or remove SSD cache tier devices using the DD System Manager.

About this task

Note: To add devices to a cache tier for DDVE instances on a KVM Hypervisor, you must use the CLI command `storage add tier cache force dev[]`.

Procedure

- Use one of the following methods to add or remove a cache tier device on a DDVE instance:
 - Launch the Configuration wizard from the DD System Manager when you create the file system: Select **Maintenance > System > Configure System > Configuration Wizard > File System > Configure Cache** .
 - Launch the wizard from the DD System Manager **Start** page: Select **Data Management > File System > Create > Create File System > Configure Cache Tier**.
 - Launch the wizard from the DD System Manager Hardware page: Select **Hardware > Storage > Overview > Cache Tier > Configure > Configure Cache Tier**.

Using the CLI to manage SSD cache tiers

Use the following CLI commands to manage the SSD cache tier for DDVE instances.

Table 6 SSD cache tier CLI commands

Command	Description
# storage add tier cache dev3	<p>Adds storage to the cache tier.</p> <pre># storage add tier cache dev3 Checking storage requirements...done Adding dev3 to the cache tier...done Updating system information...done dev3 successfully added to the cache tier.</pre>
# storage remove dev3	<p>Removes storage from the cache tier.</p> <pre># storage remove dev3 Removing dev3...done Updating system information...done dev3 successfully removed.</pre>
# storage show tier cache	<p>Displays the storage configured for cache tier.</p> <pre># storage show tier cache Cache tier details: Device Device Device Group Size ----- ----- ----- dg0 3 320.0 GiB ----- ----- ----- Spindle Devices Count Total Size Group ----- ----- ----- ----- 1 3 1 320.0 GiB ----- ----- ----- ----- Current cache tier size: 0.3 TiB Storage addable devices: Device Device Device Type Size</pre>

Configuration requirements for DD Cloud Tier support

Ensure that each DDVE instance in your system meets the resource requirements for DD Cloud Tier support.

To configure DD Cloud Tier for DDVE instances, refer to the *DD OS Administration Guide*.

Table 7 DDVE resource reservations

Configuration	CPU	Memory (GiB)	Minimum Metadata Tier Size (GiB)	Metadata Tier Throughput (MB/S)	Metadata Tier IOPS	Metadata Tier Latency (ms)
16 TB	4	32	500	160	640	14
64 TB	8	60	500	640	2560	14
96 TB	8	80	500	960	3200	14

The minimum metadata size is a hard limit. We recommend that you start with 1 TB metadata tier and use 1 TB increments.

The following table provides the recommended metadata tier size for the corresponding cloud unit (CU) size range. The *DD OS Administration Guide* provides additional information. The CU (TiB) size includes both cloud units.

Table 8 DD Cloud Tier Meta Data Size for DDVE

CU Size(TiB)	1~16	16~32	32~48	48~64	64~80	80~96	96~112	112~128	128~144	144~160	160~176	176~192
MD Size(TiB)	1	2	3	4	5	6	7	8	9	10	11	12

The *Dell EMC DD OS Administration Guide* provides additional DD Cloud Tier information.

Installing DDVE on premises

DDVE can run on premises or in the public cloud. On premises, DDVE supports VMware, Hyper-V, VxRail, and KVM platforms. The *DD OS Administration Guide* provides more information about the features and capabilities of DD physical and virtual systems.

Downloading the DDVE software

DDVE software is packaged as a ZIP file that contains a virtual machine template file (OVA for VMware environments or VHD for Microsoft environments).

Before you begin

DDVE requires a minimum of 760 GiB for configurations of 64 TB, Cloud 64 TB, 96 TB, and cloud 96 TB. For 96 TB, the minimum size of the first data disk is 500 GiB.

For smaller configurations, DDVE requires a minimum of 460 GiB of available storage to deploy, as follows:

- System disk: 250 GiB
- vNVRAM disk: 10 GiB
- First data disk: 200 GiB

About this task

All capacity configurations are available from the same zip file.

The 500 GiB evaluation version is available from the Trial Download page.


Procedure

1. Go to [Dell EMC Online Support](#).
2. Download the ZIP file that is appropriate for your environment.

Installing DDVE on a VMware ESXi Server

About this task

The hypervisor documentation provides additional details.

 **Note:** You can also use `ovftool` to install the software from the command line. For help, see the VMware documentation.

Procedure

1. Use the vSphere Client to log in to the ESXi server.
2. Launch the virtual machine deployment wizard. Step through the wizard clicking **Next** to proceed at each step.
3. Select local file or network location from which to deploy the download file.
4. Review the details of the VM where the file will be deployed.
5. Review and accept the End User License Agreement (EULA).
6. Enter a name for the DDVE virtual machine.
This name identifies the virtual machine on the VMware server. It does not become a host name on your LAN.
7. Select a dedicated datastore where the DDVE instance will reside.
Dell EMC recommends that you use a datastore that is not shared by other virtual machines.
8. Review the summary and click **Finish**.

After you finish

Configure the virtual machine. See [Initial virtual machine configuration](#) on page 27.

Installing DDVE on a VMware vCenter Server

About this task

The hypervisor documentation provides additional details.

Procedure

1. Use the vSphere Client to log in to the vCenter server.
2. Launch the virtual machine deployment wizard. Step through the wizard clicking **Next** to proceed at each step.
3. Select local file or network location from which to deploy the download file.
4. Review the details of the VM where the file will be deployed.
5. Review and accept the End User License Agreement (EULA).
6. Enter a name for the DDVE virtual machine.
This name identifies the virtual machine on the VMware server. It does not become a host name on your LAN.
7. Select the inventory location or data center to assign the DDVE instance to a host or cluster.

8. Select a host or cluster in the specified inventory location or data center where the DDVE instance will reside.
9. Select a dedicated datastore where the DDVE instance will reside.
Dell EMC recommends that you use a datastore that is not shared by other virtual machines.
10. Select the format for the virtual disks.
Dell EMC recommends Thick Provision Lazy Zeroed to provide the best balance of performance and deployment time. Thick Provision Eager Zeroed provides the best performance, but takes a long time to deploy.
11. Review the summary and click **Finish**.

After you finish

Configure the virtual machine. See [Initial virtual machine configuration](#) on page 27.

Installing DDVE in a Microsoft environment

You can install DDVE on a Microsoft Windows Server 2012 R2 or Windows Server 2016 with Hyper-V Server by creating a virtual machine or by using a PowerShell script.

Installing DDVE by creating a virtual machine

Install DDVE on a Microsoft Windows Server 2012 R2 or Windows Server 2016 with Hyper-V Server by creating a virtual machine.

About this task

The hypervisor documentation provides additional details.

Procedure

1. Provide the user name and password to log into the Windows server.
2. Launch the Hyper-V deployment wizard, clicking **Next** to proceed.
3. Specify a name for the DDVE virtual machine.

This name identifies the virtual machine on the Windows server. It does not become a host name on your LAN.

4. Specify the amount of memory to assign to the virtual machine.
5. Connect the DDVE virtual machine to the Hyper-V networking switch.
6. Select the VHD file that contains the DDVE instance.

After you finish

Configure the virtual machine. See [Initial virtual machine configuration](#) on page 27.

Installing DDVE using a PowerShell script for Hyper-V Manager

Install DDVE on a Microsoft Windows Server 2012 R2 or Windows Server 2016 using a PowerShell script for Hyper-V Manager.

About this task

Syntax: `C:\ddve-hyperv-0.6000.11.0-524942\ddve-installer.ps1 [-VMName] <String> [-Configuration] <String> [[-VirtualMachinePath] <String>] [[-VirtualHardDiskPath] <String>] [-Force] [<CommonParameters>]`

Example: `C:\PS>ddve-installer.ps1 -VMName DDVE -Configuration 8TB -VirtualMachinePath C:\DDVE -VirtualHardDiskPath C:\DDVE`

Table 9 Hyper-V Installation for Windows Powershell Script

Parameter	Description
-VMName <String>	Specify the name of DDVE virtual machine
-Configuration <String>	Specify the configuration of the DDVE. This parameter accepts one of these values 8TB, 16TB, 32TB, 48TB, 64TB, 96TB.
-VirtualMachinePath <String>	Specify the directory to store files for the DDVE virtual machine. This parameter is optional and wildcard characters are supported for this parameter value. If this parameter were not specified in command line, Hyper-V setting would be used for this parameter value.
-VirtualHardDiskPath <String>	Specify the directory to store virtual hard disks for the DDVE. This parameter is optional and wildcard characters are supported for this parameter value. If this parameter were not specified in command line, Hyper-V setting would be used for this parameter value.
-Force [<SwitchParameter>]	
<CommonParameters>	This cmdlet supports the common parameters: Verbose, Debug, ErrorAction, ErrorVariable, WarningAction, WarningVariable, OutBuffer, PipelineVariable, and OutVariable. For more information, see about_CommonParameters, available from the Microsoft website.

See `ddve-installer-help.txt` for additional information.

Installing DDVE using a PowerShell script for Microsoft System Center

Install DDVE on a Microsoft Windows Server 2012 R2 or Windows Server 2016 with Hyper-V Server using PowerShell script for Microsoft System Center.

About this task

Syntax: `C:\ddve-hyperv-0.6000.11.0-524942\ddve-installer-sc.ps1 [-VMName] <String> [-Configuration] <String> [-SCVMMServer] <String> [-SCVMHost] <String> [-SCVMNetwork] <String> [[-VirtualMachinePath] <String>] [[-VirtualHardDiskPath] <String>] [[-NetworkAdapterCount] <Int32>] [[-IPAddress] <String>] [[-Gateway] <String>] [[-Netmask] <String>] [[-DnsServer1] <String>] [[-DnsServer2] <String>] [<CommonParameters>]`

Example: `C:\PS>. \ddve-installer-sc.ps1 -VMName DDVE -Configuration -SCVMMServer localhost -SCVMHost osdev-ucs30d -SCVMNetwork mktest-vmnet -NetworkAdapterCount 3`

Table 10 Hyper-V Installation for Windows Powershell Script for MS system Center

Parameter	Description
-VMName <String>	Specify the name of DDVE virtual machine.
-Configuration <String>	Specify the configuration of the DDVE. This parameter accepts one of these values 8TB,

Table 10 Hyper-V Installation for Windows Powershell Script for MS system Center (continued)

Parameter	Description
	16TB, 32TB, 48TB, 64TB, 96TB, Cloud16TB, Cloud64TB, Cloud96TB.
-SCVMMServer <String>	Specify the system center VMM server name.
-SCVMHost <String>	Specify the Hyper-V host where DDVE will be deployed.
-SCVMNetwork <<String>	Specify a VM Network.
-VirtualMachineHostname <String>	Specify the hostname of the DDVE virtual machine. This parameter is optional and wildcard characters are supported for this parameter value. If this parameter is not specified in command line, localhost would be used for this parameter value.
-VirtualMachinePath <String>	Specify the directory to store files for the DDVE virtual machine. The VirtualMachinePath folder must exist on host SCVMHost. If this parameter is not specified in command line, Hyper-V setting would be used for this parameter value.
-VirtualHardDiskPath <<String>	Specify the directory to store virtual hard disks for the DDVE. The VirtualHardDiskPath folder must exist on host SCVMHost. If this parameter is not specified in command line, Hyper-V setting would be used for this parameter value.
-NetworkAdapterCount <Int32>	Specify the number of network adapters to be added to DDVE. If this parameter is not specified, 2 networks adapters are added. This parameter accepts value in range 1 to 8.
-IPAddress <String>	Specify IP address.
-Gateway <String>	Specify gateway IP address.
-Netmask <String>	Specify netmask.
-DnsServer1 <String>	Specify first DNS server IP address.
-DnsServer2 <String>	Specify second DNS server IP address.
<CommonParameters>	This cmdlet supports the common parameters: Verbose, Debug, ErrorAction, ErrorVariable, WarningAction, WarningVariable, OutBuffer, PipelineVariable, and OutVariable. For more information, see about_CommonParameters, available from the Microsoft website.

See `ddve-installer-sc-help.text` for additional information.

Installing the DDVE on Hyper-V using the GUI

You can use the New Virtual Machine wizard to install and configure the DDVE instance on a Hyper-V server.

Procedure

1. From the Hyper-V Manager, select the Hyper-V server on which to deploy the new DDVE instance.
2. Launch the **New Virtual Machine** wizard.
3. Click **Next** to begin creating a DDVE virtual machine with a custom configuration.
4. On the **Specify Name and Location** page, specify a location for this virtual machine, enter a name for the new virtual machine, and click **Next**.
5. On the **Specify Generation** page, select **Generation 1**.
6. On the **Assign Memory** page, enter the exact memory size (a multiple of 512 GB) required for the DDVE instance, and then click **Next**.

[Initial virtual machine configuration](#) provides additional information.

7. On the **Configure Networking** page, select a configured virtual switch to attach to the new DDVE instance and click **Next**.
8. For **Connect Virtual Hard Disk**, select an existing virtual hard disk and enter the path to the VHD file that you extracted from the DDVE OS download.
9. Verify your configuration and select **Finish**.
10. On the **Summary** page, review your configuration and select **Finish** to deploy your new DDVE VM.

A successful completion message appears. For example, You have successfully completed the New Virtual Machine Wizard. You are about to create the following virtual machine.


Configuring the DDVE on Hyper-V using the GUI

You can use the New Virtual Hard Disk wizard on Hyper-V to configure the newly installed DDVE instance.

Procedure

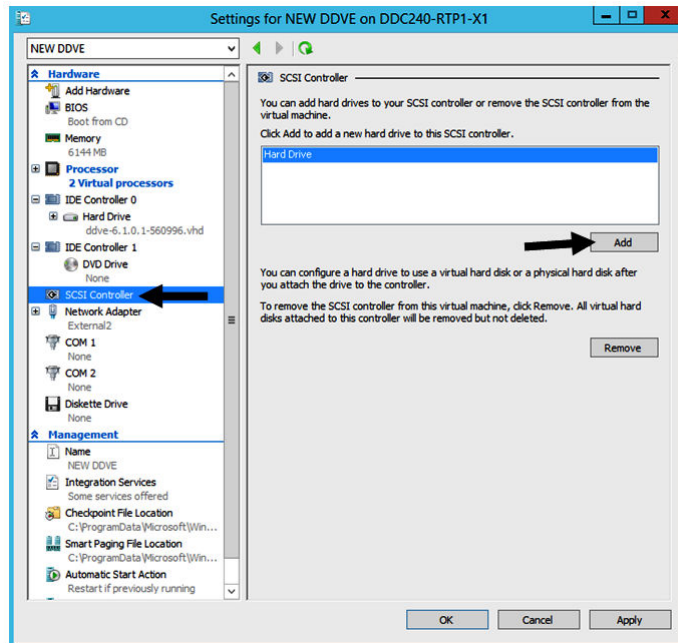
1. After the DDVE virtual machine is deployed, it appears in the virtual machines list of the Hyper-V Manager.
2. Select the new DDVE virtual machine and select the **Settings** tab to configure the CPU, vNVRAM, and storage.
3. Select **Add hardware** > **Processor** and add the required amount of CPU for your DDVE capacity, and then click **Apply**.

[Initial virtual machine configuration](#) provides more information to help you make your selection

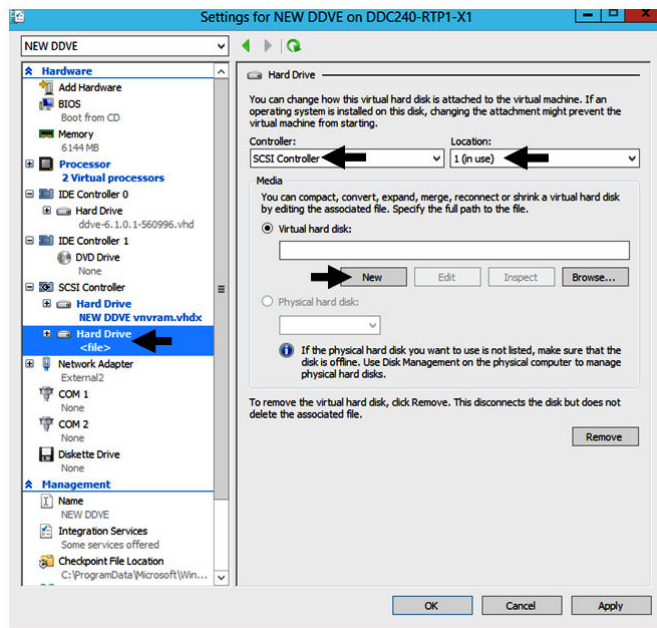
 **Note:** Do not add any restrictions to CPU resources.

4. Add a 10 GB virtual disk for vNVRAM. All disks should be thick provisioned (lazy zero).
5. Select **Add hardware**, select the first SCSI controller under IDE controller 1, and click **Add**.
6. Select **New Disk**.

The **New Virtual Hard Disk** wizard opens as shown in the following figure.



7. Attach the first 10 GB virtual disk (vNVRAM) to the first SCSI controller under IDE controller 1. Ensure that vNVRAM is set to location zero and click **New** to launch the disk configuration wizard.



8. For **Choose Disk Format**, select **VHDX**.
9. For **Choose Disk Type**, select either **Fixed**, which offers the greatest performance, or **Dynamically expanding**, and then click **Next**.
10. For **Specify Name and Location**, name the first disk as an vNVRAM disk to ensure that the vNVRAM disk resides on the highest performing physical storage, and then click **Next**:
 - Name—for example, NEW DDVE vnram.vhdx
 - Location—D:\PremiumRAIDStorage\Hyper-V\Virtual Hard Disks\

11. For **Configure Disk**, select **Create a new blank virtual hard disk**. For **Size** enter 10 to create a 10 GB disk for vNVRAM and click **Finish**.
12. On the **Summary** page, verify the configuration and click **Next**.
13. Add more virtual disks for backup data.
Use the same disk creation wizard to create up to 14 data disks for user data. Attach the data disks to the SCSI controller beginning at location 1.
14. For **Specify Name and Location**, specify the name and location of the virtual hard disk file.
15. Select **Create a new blank virtual hard disk** and specify the **Size** as 500 GB.
Using several smaller disks can offer better overall performance than fewer larger disks.
You have created the minimum configuration for a functioning DDVE instance:
 - a. OS disk is attached at IDE controller zero.
 - b. vNVRAM disk is attached at the first SCSI controller : location zero.
 - c. Data storage disk is attached at first SCSI controller : location one.
 - d. For a larger capacity DDVE instance, you can add SCSI controllers, but doing so does not increase performance.
16. Select your new DDVE, click **Start**, and configure the new virtual machine as you would any other DD appliance.

Initial virtual machine configuration

Because the DDVE template does not include storage, you must add data disks to the system. Add the disks before you start the virtual machine.

Note: You can add the first or additional virtual data disks while the virtual machine is running, provided that you do not also need to add more virtual memory to support the additional disks. DDVE supports virtual disk hot-plugging, but does not support CPU, memory, HBA card, or NIC card hot-plugging.

Depending on the amount of disk space you need, you might also need to add memory to the virtual machine. The following table shows the supported storage configurations and their virtual CPU and memory requirements.

An error message occurs if you attempt to configure a capacity with insufficient memory and CPU resources than required. The `system vresource show requirements` command lists the virtual resources available on the host.

Table 11 Memory and CPU resource requirements

Hardware configuration		Storage capacity range (TB)						
		Up to 500 GB	Up to 8 TB	Up to 16 TB	Up to 32 TB	Up to 48 TB	Up to 64 TB	Up to 96 TB
CPU	Topology	1 socket with 2 cores		1 socket with 4 cores		1 socket with 8 cores		
	Reservation	2 x 1.5 GHz		4 x 1.5 GHz		8 x 1.5 GHz		
Memory	Topology	8 GB		16 GB	24 GB	36 GB	48 GB	64 GB
	Reservation							

Adding NICs

When initially deployed, DD VE is provisioned with two VMXNET3 NICs which can be configured as required. Additional NIC cards can be added up to a maximum of:

- DD VE NICs total

Note:

The following applies specifically to VMware:

- Additional NICs can only be of type VMXNET3. NICs of type VMXNET2 and E1000(E) can be added to the DD VE virtual machine, but will not be visible or usable within DD OS on the appliance.
- DD VE does not support hot add of NICs. A VMXNET3 NIC can be added while DD VE is powered on, the NIC will not be visible or useable within the DD OS on the appliance until the DD VE appliance is restarted.
- DD VE does not support hot remove of NICs. Any attempt to remove a NIC while the DD VE appliance is powered on will cause ESXi/vSphere to report the following error: The guest operating system did not respond to a hot-remove request for device ethernet3 in a timely manner. The DD VE appliance must be powered off before NICs can be removed.

Setting up NTP time synchronization

About this task

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

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

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

Upgrading DD OS for DDVE

Use the RPM package file to upgrade the DD Operating System. The *DD OS Administration Guide* provides more information.

Use this procedure to upgrade the DDVE system for higher capacity.

1. Shutdown the DDVE using the command `system poweroff`
2. Power on the DDVE instance.
3. Add the license for the new capacity.

4. Configure the newly added metadata disks using the CLI command `storage add tier active dev<device ID>`.
5. Expand the file system using the CLI command `filesys expand`.

Powering on the virtual machine

About this task

If the installation is successful, you can power on the DDVE virtual machine and log into the system.

Procedure

1. From the hypervisor, power on the DDVE virtual machine.
 - Note:** It might take several minutes for the DD OS prompt to appear.
2. Make note of the IP Address assigned to the system by DHCP.

You can use this address to configure or administer the system outside the hypervisor.

After you finish

Complete the initial system configuration in DD OS. The *Data Domain Operating System Initial Configuration Guide* provides detailed instructions.

Note: To shut down the DDVE virtual machine, shut down the guest operating system from the DDSH with the command `system poweroff` or `system reboot`. Do not reset or power off the DDVE virtual machine, because this action performs a hard reset of the system rather than an orderly shutdown. Similarly, the Guest OS shutdown and Guest OS reboot features in the hypervisor cannot guarantee an orderly shutdown and reboot.

Refer to the hypervisor documentation for additional information.

Defining the DD system information for your site

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

Note: DD recommends that you print the tables in this section and record the information. Be sure to enter the serial number correctly to avoid DDVE issues.

Table 12 System Setup Worksheet for DDVE

Information	Your Values
A unique VM name for the system:	
The DNS domain name:	
A default gateway IP address (if you are not using DHCP):	
DNS server IP addresses (if you are not using DHCP): <ul style="list-style-type: none"> • Primary • Secondary • Tertiary 	

Table 12 System Setup Worksheet for DDVE (continued)

Information	Your Values
<p>If you will enable CIFS access, enter the information for your CIFS authentication method:</p> <p>1. For Workgroup authentication:</p> <ul style="list-style-type: none"> • Workgroup name: • Backup user name: • Password: <p>2. For Active Directory authentication:</p> <ul style="list-style-type: none"> • Realm name: • Domain admin name: • Password 	
Host name from which to administer the system:	
Administrator's email address (or admin group alias):	
Mail server (SMTP) host name:	
Hypervisor server name:	
(Optional) Physical location of the hypervisor server:	
<p>Region:</p> <ol style="list-style-type: none"> 1. Zone 2. VPC 3. subnet 	
Serial number (SN) provided to you by DD:	
Virtual machine unique ID (after initial configuration, use the <code>system show serialno</code> command to display this ID):	

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

Table 13 Ethernet Connectivity Worksheet

Ethernet Connectivity	Enable	Use DHCP	IP Address (if no DHCP)	Netmask (if no DHCP)
ethV0				
ethV1				
ethV2				
ethV3				
ethV4				

Table 13 Ethernet Connectivity Worksheet (continued)

Ethernet Connectivity	Enable	Use DHCP	IP Address (if no DHCP)	Netmask (if no DHCP)
ethV5				
ethV6				
ethV7				

Deploying DDVE on KVM hypervisor

You can run a DDVE instance as a virtual machine on top of the KVM hypervisor, which provides a full virtualization solution for Linux.

Supported Linux distributions

DDVE on KVM only supports Intel-based processors. The following Linux distributions are supported by DDVE.

Linux distribution	Version
CentOS	7-1611
Red Hat	7.2, 7.3
SUSE	12-SP2
Ubuntu	14.04 LTS Trusty, 16.04 LTS xenia

Note: Use the proper libvirt version provided by the supported Linux distributions. DDVE is supported on KVM libvirt version 1.2.2 or later. The Ubuntu 16.04 distribution supports libvirt version 1.3.4.

Prerequisites

- Install the most recent version updates for your Linux distribution.
- Create a bridged network or open vSwitch for KVM.

Configuring other resources for DDVE on KVM

DDVE on KVM requires specific resource reservations and stream counts.

Resource reservations


Ensure that your system meets the resource reservations listed in the following table.

Note: Do not over commit CPU and memory resources on the KVM host with DDVE instances.

Table 14 DDVE resource reservations

Resources		Up to 8 TB	Up to 16 TB	16 TB to 32 TB	Up to 48 TB	Up to 64 TB	Up to 96 TB
Computing resources	CPU	2 x vCPU	4 x vCPU			8 x vCPU	
	Memory	8 GB	16 GB	24 GB	36 GB	48 GB	64 GB

Table 14 DDVE resource reservations (continued)

Resources		Up to 8 TB		Up to 16 TB	16 TB to 32 TB	Up to 48 TB	Up to 64 TB	Up to 96 TB	
Underlying storage requirements	Random IOPS	160	320	650	1280	1920	2560	3200	
	Random I/O latency	14 ms							
	Sequential throughput	40 MB/s	80 MB/s	160 MB/s	320 MB/s	480 MB/s	640 MB/s	960 MB/s	
	RAID	RAID 5/6 or similar fault tolerance storage							
	SCSI controllers	Virtio SCSI							
	vNVRAM simulation file size	512 MB			1 GB			2GB	
		Configurations with DD Cloud Tier support has the same vNVRAM size as the corresponding ones without DD Cloud Tier.							
System disks	<ul style="list-style-type: none"> 250 GB root disk 10 GB vNVRAM disk <p> Note: The root disk and vNVRAM disk are required to deploy the DDVE.</p>								

DDVE on KVM stream counts

Ensure that your system capacity meets the required stream counts listed in the following table.

Table 15 Stream counts for each capacity

Configurat ion	Write Stream	Read Stream	Repl Source	Repl Dest	Mixed Stream	Max Mtree
8 TB	20	16	20	20	30	6
16 TB	45	30	45	45	60	6
32 TB	90	50	90	90	90	14
48 TB	90	50	90	90	90	14
64 TB	90	50	90	90	90	32
96 TB	180	50	90	180	180	32

Deploying the DDVE on the KVM Hypervisor

You can deploy the DDVE instance on KVM hypervisor.

Deploying DDVE on KVM using a reference script

The DD VE for KVM image contains reference scripts to deploy the DDVE image on KVM hypervisor and add the data disks to a deployed DDVE. The scripts can be modified to run in your

environment and are included in the `tar.gz` file that you downloaded for the DDVE on KVM installation.

About this task

The script completes the following operations:

1. Generates the VM domain XML file `config.xml`.
2. Creates a new VM domain named `ddve-test`.
3. Converts the `.qcow2` root disk in the `tar.gz` package to RAW format for better performance.
4. Attaches the root disk to SCSI 0:0.
5. Creates a 10 G raw disk named `ddve-test-vnvrsm` and attaches the disk to SCSI 0:1.
6. Sets up CPU and memory configuration for the DDVE virtual machine according to DDVE sizing guidelines.
7. Sets up network configuration for the DDVE instance.
 - a. Creates two virtual network interfaces.
 - b. Uses `bridge` as the interface type.

Procedure

1. Extract the `tar.gz` file.

For example, `tar -xvf ddve-kvm-0.6120.12.0-563880.tar.gz` or `tar -xvf ddve-kvm-0.6120.12.0-xxxxxx.tar.gz` where `xxxxxx` is the build number).

2. Change directory to the extracted folder.
3. To deploy a DDVE instance without data disks, run the script shown in the following example. The example creates a 16 TB configuration DDVE instance with the name `ddve-test` on `br0` network interface with the DDVE root disk and vNVRAM disk on `/kvm-root` directory.

```
./kvm-ddve-installer.sh -n ddve-test -r /kvm-root -c 16TB -b br0
i Note: [root@ddqa-r730-d05 ddve-kvm-6.1.2.5-595467]# ./kvm-ddve-
installer.sh -h Distribution: rhel Version:7.3. The host version check done. Basic
Validation done. Usage: ./kvm-ddve-installer.sh [options]
```

Where the options are:

- `-n` —Specify the virtual machine name (default will be the name of the DD VE build).
- `-r` —Specify the root disk full path (default will be the folder where installer script executed).
- `-c` —Specify the configuration 8TB, 16TB, 32TB, 48TB, 64TB, 96TB, Cloud16TB, Cloud64TB, and Cloud96TB.
- `-b` —Specify the bridge name (default will be `br0`).
- `-p` —Specify provision type for the data disk created on NFS. By default, the thin provisioning disk is created on NFS.
- `-s` —Specify the disk size in TB or GB (when option `-s` is specified, options `-d` and `-x` are mandatory).
- `-x` —Specify the number of data disks (when option `-x` is specified, options `-d` and `-s` are mandatory).
- `-d` —Specify the path where the data disks will be stored (when option `-s` is specific, options `-s` and `-x` are mandatory).

- `-w` —Wait for IP address. The IP address of the DD VE will be displayed after deployment after a 5-minute wait for it to become available.
- `-h` —Help message.

Note: Options `-s`, `-x`, and `-d` must be used as a set. If any of these options is used, the other two in the set are required.

4. To deploy a DDVE instance with a data disk, run the script shown in the following example. The example creates a 4x4 TB data disk on `datastore1` along with the deployment of a 16 TB DDVE instance.

```
./kvm-ddve-installer.sh -n ddve-test -r /kvm-root -c 16TB -b br0 -x
4 -s 4TB -d /datastore1
```

5. To add a data disk to the existing DDVE instance, run the script shown in the following example. The example creates a 4x2 TB data disk on `datastore2` for the DDVE with the name `ddve-8tb`).

```
./kvm-add-disk.sh -n ddve-8tb -x 4 -s 2TB -d /datastore2
```

Note: `kvm-ddve-installer.sh` can only be run once per extraction, because it converts the `qcow2` into raw format. Any subsequent execution of the script will cause failures because `qcow2` no longer exists.

Deploying the DDVE on KVM using the Virtual Machine Manager

The DDVE for KVM image deploys the DDVE image on the KVM hypervisor using `virt-manager`. Use this procedure to create a DDVE virtual machine and configure the DDVE instance.

About this task

The example in this procedure deploys an 8 TB DDVE instance.


Procedure

1. Create a DDVE virtual machine:
 - a. Open Virtual Machine Manager.
 - b. Select **File > New Virtual Machine**.
 - c. Select **Import existing disk image > Forward**.
 - d. Click **Browse** to select the root disk file.
 - e. Select **Linux > Red Hat Enterprise Linux 6.4 > Forward**.
 - f. Enter a name for the virtual machine, select **Customize configuration before install**, and click **Finish**.
2. Configure the DDVE instance:
 - a. In the left pane, select **Processor**, configure the following settings, and then click **Apply**:
 - **Current/Maximum allocation**—2.
 - **Model**—Hypervisor Default.
 - Select **Manually set CPU topology** and set:
 - **Sockets**—1
 - **Cores**—2
 - **Threads**—1

- b. Select **Add Hardware** > **Controller**, type `scsi` and for Model, type `virtio_scsi`, and then click **Finish**.
- c. Select **Add Hardware** > **Network**, configure the following settings, and then click **Finish**:
 - **Network source**—Enter the bridge name on the host.
 - **Device Model**—`virtio`.
- d. Click **Begin Installation**.

Best Practices for deploying the DDVE on a KVM hypervisor

- Shut down the virtual machine before you make any changes to virtual machine settings with `virsh edit`. Some settings do not take effect after a virtual machine restart but only after a virtual machine shutdown.
- We recommend that you sync the KVM host to NTP. By default for DDVE on KVM, the KVM clock is enabled. Power on and restart the system. The DDVE instance syncs with the KVM hypervisor.
- For the Ubuntu 16.04 distribution, update the `libvirt` package to version 1.3.4.
- Verify the directory permissions on the KVM host before trying to deploy the DDVE instance. If directory permissions are incorrect, you might encounter these error messages: `native: could not open disk image` or `Could not open ... Permission Denied`. When mounting to a remote directory, ensure that the directory permissions are correct for both the `qemu` user and the current user during the deployment.

 **Note:** The `qemu` user needs search permissions all the way up the path of the directory tree.

Creating a bridged network interface using Virtual Manager

Supported Linux distributions might use different configuration files and different commands in the command line interface (CLI). To use the CLI, refer to the Linux vendor documentation for your Linux distribution for additional information.

About this task

By default, KVM uses Usermode Networking, where NAT is performed on traffic through the host interface to the outside network. A DDVE best practice is to use a Bridge Network, which allows external hosts to access the guest virtual machine directly. Guest virtual machines are connected directly to the host network.

Procedure

1. Verify that the bridging kernel is installed by running this command: `modprobe --first-time bridge`

An error message should appear stating that the module is already in the kernel.

2. Use the GUI or CLI commands to find the name of the physical interface on your host. Verify that it is physically connected and functional.

This interface is used in the network bridge. You can use the following CLI commands:

- `ifconfig` - lists the interfaces on the host.
- `ethtool <int name>` - displays details about the interface .

3. Open the Virtual Manager (`virt-manager`).
4. Click **Edit** > **Connection Details** > **Network Interfaces**.

5. On the **QEM/KVM Connection Details** screen, click the plus button (+) at the bottom of the screen to start the **Add interface** wizard.
6. On the **Configure Network Interface** screen in the **Interface type** list, ensure that **Bridge** is selected, and then click **Forward**.
7. Ensure that the bridge interface name is **br0** and from the **Start mode** list, select **Onboot**.
8. Verify that the bridge interface has the correct IP address settings. To change the IP settings click **Configure**.
9. On the **IP Configuration** screen, click through the IPv4 and the IPv6 tabs to configure the settings, and then click **OK**.

You can configure the bridge interface to pick up the IP address from DHCP or you can statically configure the IP address if you know the network settings.

10. Click **Configure** for the bridge settings.
11. Clear the **Enable STP** check box, and then click **OK**.
12. Select the physical interface that will be a member of this bridge, ensure that only one interface is selected, and then click **Finish**.
13. Reboot or restart the network services:

```
systemctl restart network
```

14. Verify that the bridge interface is running:

```
ifconfig br0
```

15. You can also verify the bridge interface in the virt-manager GUI: Click **Edit > Connection details > Network interaces > br0**.

Results

The connection is complete.

CHAPTER 3

Completing Initial DDVE Configuration

This chapter includes the following topics:

- [Initial System Configuration](#) 38
- [Monitoring performance](#)..... 44
- [Configuring other resources](#) 44
- [Configuring optional software and internal licenses](#)..... 46
- [Configuring optional system settings](#) 46

Initial System Configuration

You can connect to the system to perform the initial system configuration with the DDSM Configuration Wizard or manually using the CLI.

DHCP is enabled on the DDVE system by default. If the DHCP service is available, the DDVE system will receive IP addresses from the DHCP server.

Note: DHCP is only activated automatically for the first network interface card (NIC) which is built into the virtual machine template. Any extra NICs must be configured manually by following instructions here <https://docs.microsoft.com/en-us/azure/virtual-network/virtual-network-network-interface-vm>.

Using the CLI

Access the CLI by using `ssh` or a terminal emulator to access the DD OS command line. The CLI configuration utility contains four sections: Network, eLicense, System, and DD Boost.

Using the GUI

Access DDSM by entering the IP address of the DDVE into a web browser, and logging in. The GUI Configuration Wizard contains six sections: Networking, File System, System Settings, DD Boost, CIFS, and NFS.

[Completing Initial Configuration with the Command-Line](#) on page 43 describes how to configure the DDVE manually with the CLI instead of using the configuration utility.

DDVE storage guidelines

Be aware of the following virtual storage guidelines for DDVE before deploying a DDVE instance.

DDVE licenses are sold in Terabytes (TB), but VMware disk sizes are actually measured in Tebibytes (TiB). 1 TB is equal to 0.97 TiB or 1.02 TB is equal to 1 TiB. Because of this, DDVE allows a 10% buffer to reach the licensed capacity measured in TB. Additionally, Hyper-V manager also uses GiB for "GB" in its GUI.

Table 16 TB to TiB equivalents

Licensed capacity in TB	Licensed capacity in TiB	Maximum capacity with buffer in TB
8 TB	7.3 TiB	8.8 TB
16 TB	14.6 TiB	17.6 TB
32 TB	29.2 TiB	35.2 TB
48 TB	43.8 TiB	52.8 TB
64 TB	58.4 TiB	70.4 TB
96 TB	87.6 TiB	105.6 TB

Individual virtual disks are subject to overhead that reduce their amount of usable capacity to amounts lower than their specified capacity.


- The first data disk is subject to 120 GB of base overhead, with 5.6% of the remaining capacity reserved for RAID-on-LUN
- All subsequent data disks are subject to 5.6% overhead reserved for RAID-on-LUN

Table 17 Virtual disk overhead calculations

Disk	Overhead calculation	Usable capacity examples
First data disk (200 GB or more)	(Total capacity - 120 GB) * 0.944	<ul style="list-style-type: none"> • 200 GB disk: 75.5 GB • 300 GB disk: 169.9 GB • 400 GB disk: 264.3 GB • 500 GB disk: 358.7 GB
All subsequent data disks (100 GB or more)	Total capacity * 0.944	<ul style="list-style-type: none"> • 100 GB disk: 94.4 GB • 200 GB disk: 188.8 GB • 300 GB disk: 283.2 GB • 400 GB disk: 377.6 GB • 500 GB disk: 472 GB

Configuring DDVE in DD System Manager

DDVE licensing and configuration can be accomplished through the Configuration Wizard in DD System Manager. After the initial installation of a DDVE instance, the Configuration Wizard automatically appears after the licensing screen on the first launch of DDSM.

 **Note:** The DAT is not supported for cloud DDVE.

Enter the DDVE virtual machine IP address into a web browser to launch DD System Manager. Log in with the following credentials:

- Username: sysadmin
- Password: changeme

DDVE licensing

The **Apply Your License** window is the first screen that appears when DDSM is launched for the first time. The DDVE instance is locked until a license file is applied.

Click **Browse**, locate the license file for a purchased capacity license or the evaluation license included with the DDVE download, then click **Apply**.


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

Figure 1 DDVE Node Locking ID

Apply Your License

Use: License File

License File:

Node Locking ID: 5H1XYV54N7XXZVR72UYW2BL2RNYWFAX
TS2CAFKZT854A3MUK6P5ECMDHGYDGR9
AJZPLUPVFG3UZCYG42PZZH8U45GJDUV
WK2FMWAMMW9ASRY

i To get started, apply the evaluation license that came with the download. To obtain a production license for your system, use the node locking information given here with the instructions provided in the License Activation certificate (LAC) email. The LAC email was included with your order information.

Learn more about License Activation Certification

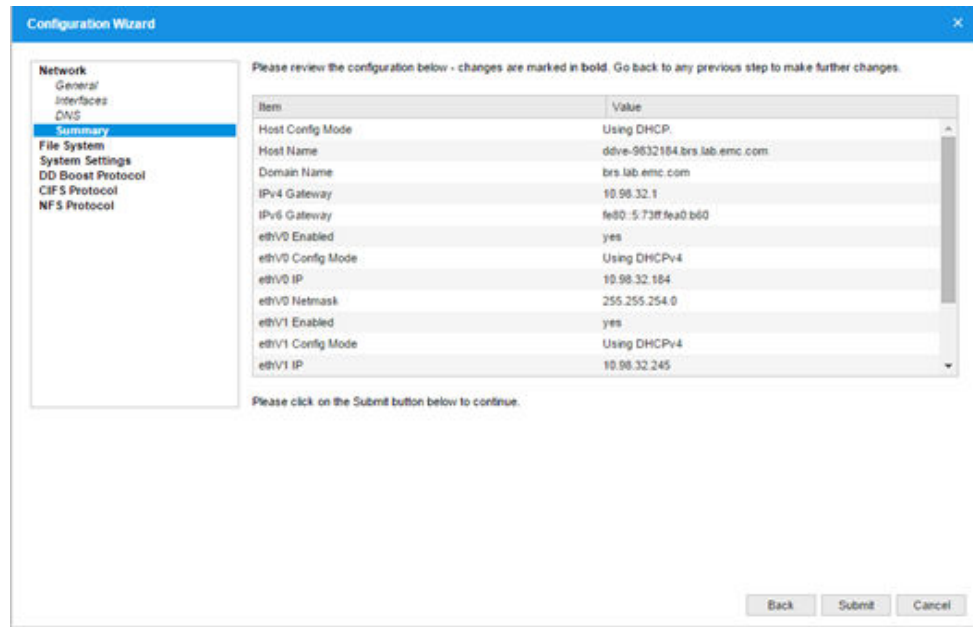
i **Note:** When you obtain the original license file name from the server, do not enter the comma in the license file name. DD OS will not accept the name if the comma is used.

DDVE configuration

After applying the DDVE license, the Configuration Wizard begins automatically. The wizard assists in configuring the following aspects of the DDVE:

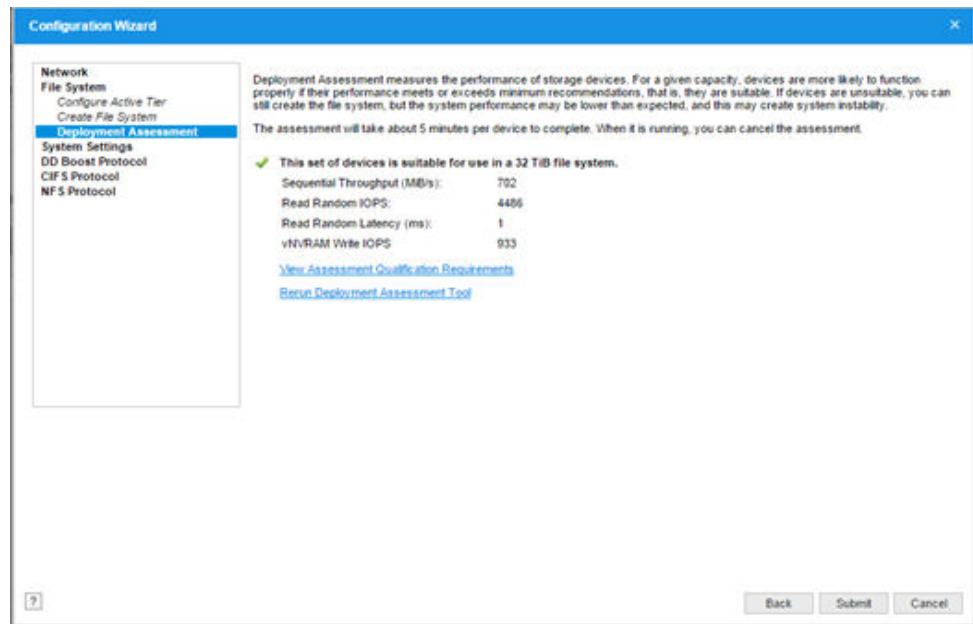
- Networking
 - DHCP or manual settings
 - Virtual interface ethV0 and ethV1 configuration
 - DHCP or manual DNS configuration

Figure 2 Configuration Wizard - Network



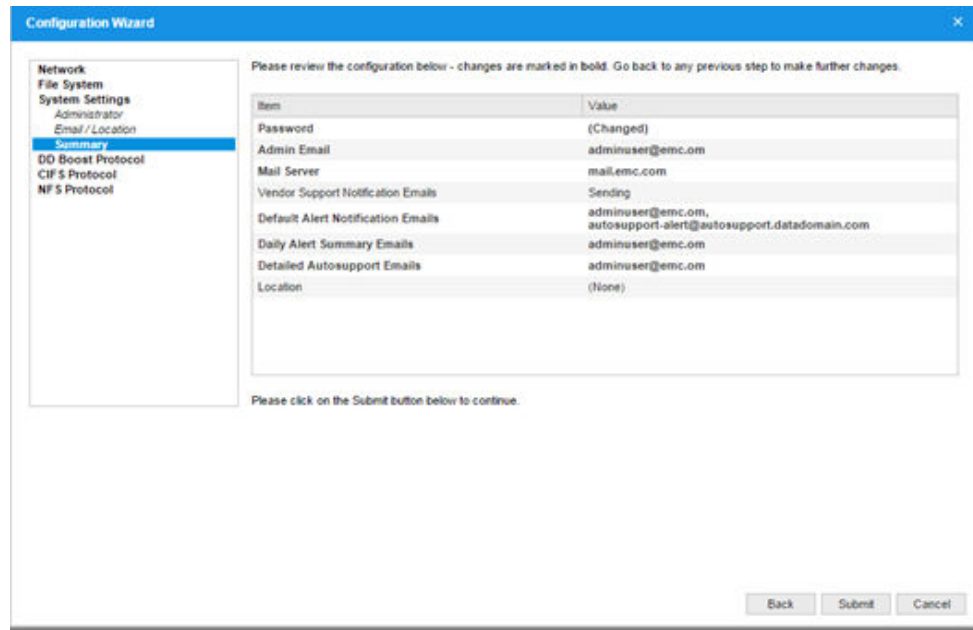
- File system
 - **Note:** DDVE supports a maximum of six MTrees active at a given time, however up to 100 MTrees can be created on DDVE.
 - Create virtual storage devices
 - Optionally enable the DDFS automatically after creating it

Figure 3 Configuration Wizard - File System



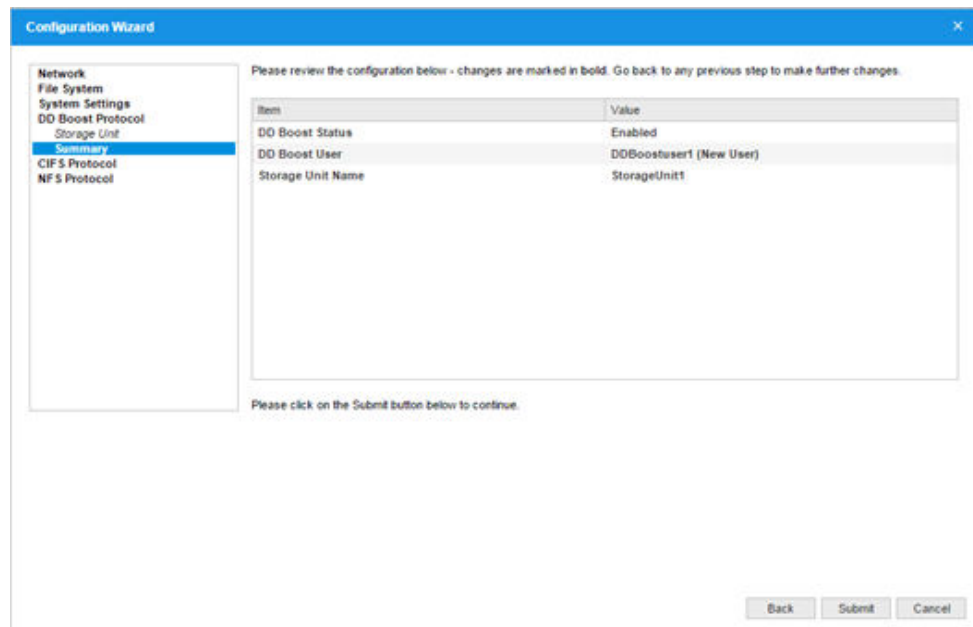
- System settings
 - Update the sysadmin password
 - Optionally configure alert and autosupport email settings

Figure 4 Configuration Wizard - System Settings



- DD Boost
 - Create a Boost storage-unit, and assign a user ID to own it

Figure 5 Configuration Wizard - DD Boost Protocol



Provisioning the storage with the CLI

Provision virtual disks using the command line interface (CLI).

Procedure

1. Log into the system as `sysadmin`.
The default password is `changeme`.

At the first login, use the `elicense` command to add a DDVE license.

2. Press Ctrl-C to exit the configuration utility.
3. Confirm that virtual disk dev3 exists and has the expected size:


```
# disk show hardware
```

 The output should include a line similar to the following example:


```
dev3 VMware Virtual disk 1.0 (unknown) 256.00 GiB SAS n/a
```

 The virtual disks (dev1 and dev3) are used for the system software and cannot be used for storage. The `disk show state` command shows `System Dev` for these system disks.
4. (Optional) Run DAT tool test:
 - Start DAT tool test: `# disk benchmark start dev3`
 - Monitor the test progress: `# disk benchmark watch`
 - View test results: `# disk benchmark show`
5. Add the storage disk to the active storage tier:


```
# storage add dev3
```

 If you are adding more than one virtual disk, repeat the `storage add` command for each disk.
6. Create the file system:


```
# filesystems create
```

 The `filesystems create` command might take longer to complete if the hypervisor's storage is slow and does not meet the minimum recommendations.
7. Enable the file system:


```
# filesystems enable
```

After you finish

Complete the initial system configuration. See [Completing Initial Configuration with the Command-Line](#).

Completing Initial Configuration with the Command-Line

About this task

Follow the configuration utility instructions for entering appropriate values. At the end of each configuration section, you can Save, Cancel, or Retry (restart the input entry at the beginning of the current section).

At each prompt, you can:

- Enter a value
- Enter a question mark (?) for more details
- Press Enter to accept the value displayed in braces.

The utility accepts list entries that are comma-separated, space-separated, or both.

 **Note:** You can enable NTP using the configuration utility.

Procedure

1. Enter the `config setup` command to start the configuration utility.
2. Prompts guide you through configuring the following parameters:

- System name
 - System domain name
 - Initial IP port—Select DHCP or enter a static IP address and Net Mask.
3. At the prompt, do one of the following:
- Exit the configuration utility and continue configuring the system using the GUI
 - Continue using the CLI configuration utility.

Configuring the system for data access

If you did not configure data access with the configuration wizard, use the procedures referenced in this section to configure one or more protocols.

Depending on your environment, you must configure one or more protocols and clients for data access. Clients enable access to the DDVE system with the configured protocol. The DDVE system provides the DD Boost protocol for cloud or on-premises systems.

- DD Boost—For setting up the DD Boost feature, see the *DD Boost for Open Storage Administration Guide* or *DD Boost for Partner Integration Administration Guide*, available at <https://support.emc.com>.
- Application integration—For information about how to integrate the DD system with backup software, see the documentation for the applicable application at the DD Integration Documentation section on the DD Support web site <https://support.emc.com>.

Monitoring performance

Use the performance monitoring feature of DDVE to troubleshoot issues.

Dell EMC recommends that you enable the performance monitoring features of the DDVE instance, which enable you to detect performance problems on the physical storage layer.

The system provides a deployment assessment tool (DAT) which runs on DDVE. It measures the underlying I/O performance and determines the size of the file system. You can use DAT to scan the available physical storage to determine if the storage meets DDVE requirements. [Table 18](#) on page 45 lists the required physical storage specifications for DDVE. You can access the DAT using the CLI or from the DDVE GUI console.

DDVE provides DAT testing for the Boost protocol only and will skip vNVRAM values to enhance DDVE performance.

 **Note:** Use the `with-vnvram` option if you are using NFS to write backups.


Configuring other resources

This section discusses resources other than storage.

CPU resources

For VMware environment, [Initial virtual machine configuration](#) on page 27 lists the CPU requirements.

For a Windows environment, the CPU reservation is configured as a percentage. **Virtual Machine Reserve** should be set to 100%.

 **Note:** Do not reduce system memory after you have created the file system in DD OS. Reducing memory makes the file system unusable.

Network adapters

DDVE can support up to eight virtual network adapters.

For VMware environments, the OVA package creates two VMXNET3 virtual network adapters by default. DHCP is configured automatically on these two interfaces within DDVE. You can configure DHCP manually on any additional interfaces.

For Windows environments, DHCP is configured automatically for up to two network interfaces. You can configure DHCP manually on any additional interfaces.

Disk controllers

For VMware environments, DDVE supports up to four VMware Paravirtual SCSI Controllers. Other types of SCSI controllers are not supported.

For Windows environments, DDVE supports up to four Microsoft SCSI controllers.

One SCSI Controller is configured by default. The maximum number of disks for each controller is 15 for vSphere and 64 for Hyper-V. If the environment requires more than the maximum number of disks, you can add SCSI HBA controllers to the DDVE system, but do not change the HBA controller type from the type of the first HBA controller. If you make changes accidentally, power off the virtual machine and restore the original settings.

VMware resource pools and vApp containers

If you add DDVE systems to resource pools or vApp containers, do not override the default memory and CPU resource allocation settings. If the DDVE virtual machine does not meet the minimum resource requirements, it fails to start and reports an `insufficient resource` message. The following table lists the minimum resource requirements.

If you attempt to configure a higher capacity with fewer memory and CPU resources than the minimum requirements, the system displays an error message. To check the settings, in the vSphere Client open the **Resources** tab of the **Virtual Machine Properties** dialog box or use the `system vresource show requirements` command.

Table 18 DDVE resource reservations

Resources		Up to 8 TB	Up to 16 TB	16 TB to 32 TB	Up to 48 TB	Up to 64 TB	Up to 96 TB
Computing resources	CPU	2 x GHz vCPU	4 x GHz vCPU			8 x GHz vCPU	
	Memory	8 GB	16 GB	24 GB	36 GB	48 GB	64 GB
	Shares	Normal					
	Limit	Unlimited					
Underlying storage requirements	Random IOPS	320	650	1280	1920	2560	3200
	Random I/O latency	14 ms					
	Sequential throughput	80 MB/s	160 MB/s	320 MB/s	480 MB/s	640 MB/s	960 MB/s
	RAID	RAID 5/6 or similar fault tolerance storage					
	SCSI controllers	For Hyper-V and ESX: Up to 4 SCSI controllers. For KVM: Virtio SCSI.					
	vNVRAM simulation file size	512 MB	512 MB	1 GB	1 GB	1 GB	2GB
		Configurations with DD Cloud Tier support has the same vNVRAM size as the corresponding ones without DD Cloud Tier.					

Table 18 DDVE resource reservations (continued)

Resources		Up to 8 TB	Up to 16 TB	16 TB to 32 TB	Up to 48 TB	Up to 64 TB	Up to 96 TB
	System disks	<ul style="list-style-type: none"> 250 GB root disk 10 GB vNVRAM disk <p>Note: The root disk and vNVRAM disk are required to deploy DDVE.</p>					
	Data disks	<ul style="list-style-type: none"> The minimum first data disk size: 500GiB for 64TB, Cloud 64TB, 96TB, and Cloud 96TB; 200GiB for all other configurations All subsequent data disks: at least 100 GB <p>Whenever possible, use disks that are larger than the minimum required disk sizes. The maximum capacity of DDVE is defined by the DDVE license, and the maximum virtual disk size supported by the hypervisor.</p> <p>Note: The usable capacity available on a data disk is less than the capacity specified when the disk was created because of overhead requirements. DDVE storage guidelines on page 38 provides additional details about DDVE storage overhead requirements.</p>					
Network adapters		Up to 8 network adapters					

Configuring optional software and internal licenses

If you need to configure optional software features, you must install and activate the appropriate licenses before you configure those features. See [Introducing DDVE](#) on page 9 for information about features and licenses that are available to for DDVE.

A separate license is required for DD Cloud Tier.

The *DD OS Administration Guide* provides information about installing licenses and configuring optional software. Refer to the applicable *DD OS Release Notes* for the most up-to-date information on product features, software updates, software compatibility guides, and information about our products, licensing, and service. Access the latest documents at <https://support.emc.com>.

Configuring optional system settings

See the *DD Operating System Initial Configuration Guide* for help performing typical but optional initial system configuration tasks. The following table provides a summary of the DD OS CLI commands for some common tasks.

Note: Any system command that accepts a list, such as a list of IP addresses, accepts entries separated by either commas or spaces. The *DD Operating System Command Reference Guide* provides command details.

Task	Command
Add users to the email list that reports system problems	# alerts notify-list add group-name
Add users to the system report email list	# autosupport add {alert-summary asup-detailed} emails email-list

Task	Command
Enable FTP or TELNET	# adminaccess enable {ftp telnet}
Add remote hosts to use FTP	# adminaccess ftp add <host list>
Add a user	# user add name [role {admin user}]
Change a user's password	# user change password username
Shut down the system	# system poweroff

The *DD Operating System Administration Guide* provides details about enabling remote management.

CHAPTER 4

Administering DDVE

This chapter includes the following topics:

- [Adding virtual storage](#) 50
- [Extensions to DDOS for DDVE](#)..... 50
- [DDVE-only commands](#)..... 53
- [Modified DD OS commands](#)..... 54
- [Unsupported DD OS commands](#) 57
- [Troubleshooting performance issues](#)..... 62

Adding virtual storage

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

Note: DDVE does not support the use of VMware RDM volumes.

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

Using the GUI

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

After adding the storage, click **Data Management > File System > Expand Capacity > Next** to launch the DAT to verify the hardware supporting the virtual storage meets the requirements for DDVE.

Using the CLI

When you add a new virtual data disk to an existing DDOS file system, use the `filesys expand` command instead of the `filesys create` command. For instructions and restrictions, see [Initial Virtual Machine Configuration with the vSphere Client](#).

Extensions to DDOS for DDVE

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

Storage performance evaluation

Manage virtual disk performance benchmark tests.

Storage performance can be evaluated in two ways:

- With the DAT in DDSM
- With the `disk benchmark` command in the DD OS CLI

DAT

In addition to being part of the DDSM Configuration Wizard, DAT can be run as part of the process of adding new devices to expand the file system on the DDVE instance.

Note: Running DAT before expanding the file system requires the presence of at least one device to add to the active storage tier. Also, benchmark should not be run when virtual disks are absent.

In DDSM, click **Data Management > File System > Expand Capacity**.

Click **Configure** to add devices to the active tier, or click **Next** if you have already added the devices to the active tier.

Run the DAT to analyze the underlying storage performance.

disk benchmark

```
disk benchmark requirements
```

Displays the currently configured recommended performance characteristics by disk capacity.

```
disk benchmark start <dev-list>
```

Start a performance benchmark test on one or more data disks in series or in parallel.

- Specify `dev[3-5]+dev7+dev[10-12]` to test the specified devices in sequence, one after the other.
- Specify `dev(3-5) dev7 dev(10-12)` to test the specified devices in parallel.

Example 1

Test `dev3`. When that test finishes, test `dev4`.

```
# disk benchmark start dev[3-4]
```

Test `dev3` and `dev4` in parallel.


```
disk benchmark start dev(3-4)
```

Start two series of tests in parallel. The two series of tests are `dev3` followed by `dev4`, and `dev5` followed by `dev6`.

```
# disk benchmark start dev(3-4) dev(5-6)
```

```
disk benchmark show {[[detailed] test-id] | all | requirements}
```

Print disk performance benchmark test results and report a recommended capacity for the tested configuration. With no arguments, the command prints information about the most recent test for every disk. Specify a *test-id* to see information about a single test. Specify *all* to see a table of previous and currently running tests. Specify *requirements* to see a table of performance goals.

 **Note:** The `disk benchmark show` command shows the results of the test of storage performance on the host system to determine which DDVE capacity configurations can be supported on the host.

```
disk benchmark start
```

Conducts a test of storage performance.

```
disk benchmark stop
```

Stop all running tests.


```
disk benchmark watch
```

Display the ongoing results of all tests in progress.

disk benchmark (for SSD cache performance)

```
disk benchmark start <dev-list> cache <dev-list>
```

Start a performance benchmark test on one or more cache devices. Where *cache <dev-list>* is an optional argument.

 **Note:** The *<dev-list>* argument for cache devices is listed in parallel. Serial testing of cache devices is restricted, and not supported.

Example 2

Cache device in parallel (supported):

```
# disk benchmark start dev5+dev6+dev7 cache dev3:dev4
```

Cache device in serial (not supported):

```
# disk benchmark start dev5+dev6+dev7 cache dev3+dev4
```

```
# disk benchmark show requirements <cache>
```

Displays the currently configured recommended performance characteristics for cache capacity. Where *<cache>* is an optional argument.

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]
```

```
sysadmin@zx-benchmark-1# system vresource show requirements
  Active Tier      Cloud Tier
Instance
Capacity (TB)    Capacity
(TB)
-----
8                n/a    Standard_F4 (Only block storage is
supported)
Standard_F8      16     n/a
Standard_D4_v2   32     n/a
Standard_D16_v3 96     n/a
Standard_D32s_v3 256    n/a
-----
** 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 19 DDVE-only commands

Command	Description
<code>elicense checkout feature-license <feature-name-list></code>	Allows user to check out the features of licenses for License Server installation
<code>elicense checkout capacity-license <feature-name> value <n> {TB GB}</code>	Allows user to check out the capacity of licenses for License Server installation. Here is sample output: <pre>sysadmin@localhost# elic checkout capacity-license capacity value 10 TB Checking out CAPACITY license willl 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 REPLICATION, DDBOOST, ENCRYPTION. Total 10 TB CAPACITY license is now available on this system.</pre>
<code>elicense checkin {<feature-name-list> all}</code>	Allows user to check in features for licences for License Server installation
<code>elicense license-server set server {<ipaddr> <hostname>} port <port-number></code>	
<code>elicense license-server reset</code>	Returns DDVE to factory license settings.
<code>elicense license-server show</code>	
<code>filesys show space tier active local-metadata</code>	Displays the usage for the metadata storage. i Note: 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.
<code>net hosts add</code>	Two DDVEs in different regions cannot resolve each other's hostname. Run this command to add a host list entry. i Note: For VNET to VNET connection between different regions in Azure, see Microsoft.com .
<code>storage object-store enable</code>	Enables the object-store feature for DDVE.

Table 19 DDVE-only commands (continued)

Command	Description
<code>storage object-store disable</code>	Disables the object-store feature for DDVE.
<code>storage object-store profile set</code>	Configures the object-store access profile.
<code>storage object-store profile show</code>	Displays the object-store access profile.
<code>storage object-store profile status</code>	This CLI lists the object-store profile information set on the DDVE.
<code>system vresource show [requirements]</code>	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 <code>requirements</code> option displays the physical storage requirements for DDVE.
<code>vserver config set</code>	DDVE supports the hypervisor's functionality to collect performance statistics from the hypervisor. These performance statistics can be used to troubleshoot the DDVE performance problems. To do that, users need to specify the vServer information (hostname or IP address) and the credential information (username and password). The vServer can be a vCenter server, an ESXi host for vSphere, a Hyper-V server, or an SVCMM server for Hyper-V. Once this information is configured, DDVE will collect performance statistics from the vServer every 5 minutes.
<code>vserver config reset</code>	Reset the vServer credentials for DDVE to their default values.
<code>vserver config show</code>	Display the vServer credentials for DDVE.

Modified DD OS commands

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

Table 20 Modified DD OS commands

Command	Changes
<code>alert</code>	The <code>tenant-unit</code> parameter is not supported.
<code>compression</code>	The <code>tenant-unit</code> parameter is not supported.
<code>config setup show</code>	Arguments for configuring features not available in DDVE have been removed.
<code>ddboost clients show active</code>	The <code>tenant-unit</code> parameter is not supported.

Table 20 Modified DD OS commands (continued)

Command	Changes
<code>ddboost file-replication show active</code>	The <code>tenant-unit</code> parameter is not supported.
<code>ddboost file-replication show detailed-file-history</code>	The <code>tenant-unit</code> parameter is not supported.
<code>ddboost file-replication show file-history</code>	The <code>tenant-unit</code> parameter is not supported.
<code>ddboost option reset</code>	The <code>fc</code> parameter is not supported.
<code>ddboost option show</code>	The <code>fc</code> parameter is not supported.
<code>ddboost storage-unit create</code>	The <code>tenant-unit</code> parameter is not supported.
<code>ddboost storage-unit modify</code>	The <code>tenant-unit</code> parameter is not supported.
<code>ddboost storage-unit show</code>	The <code>tenant-unit</code> parameter is not supported.
<code>ddboost streams show active</code>	The <code>tenant-unit</code> parameter is not supported.
<code>ddboost streams show history</code>	The <code>tenant-unit</code> parameter is not supported.
<code>disk rescan</code>	The <code><enlcosure-ID>.<disk-ID></code> parameter is not supported.
<code>disk show state</code>	DDVE system disks show the <code>System Dev</code> state.
<code>disk show stats</code>	The DDVE format for this command is <code>disk show stats [dev <n>]</code>
<code>disk status</code>	The <code>Spare</code> row has been removed from the output. The <code>System</code> row has been added.
<code>enclosure show all</code>	The <code>[<enclosure>]</code> parameter is not supported.
<code>enclosure show controllers</code>	The <code>[<enclosure>]</code> parameter is not supported.
<code>enclosure show cpus</code>	The <code>[<enclosure>]</code> parameter is not supported.
<code>enclosure show io-cards</code>	The <code>[<enclosure>]</code> parameter is not supported.
<code>enclosure show memory</code>	The <code>[<enclosure>]</code> parameter is not supported.
<code>filesystem encryption keys delete</code>	The <code>[tier {active archive} archive-unit <unit-name>]</code> parameter is not supported.

Table 20 Modified DD OS commands (continued)

Command	Changes
fileSYS encryption keys show	The [tier {active archive} archive-unit <unit-name>] parameter is not supported.
fileSYS fastcopy	The [retention-lock] parameter is supported with DDVE 4.0. Retention lock governance mode is supported for DDVE on premises. Retention lock compliance mode is not supported for any DDVE.
fileSYS show compression	The [tier {active archive} archive-unit <unit-name>] parameter is not supported.
fileSYS show space	The [tier {active archive} archive-unit <unit-name> arcjove-unit {all <unit-name>}] parameter is not supported.
mtree create	The tenant-unit parameter is not supported.
mtree list	The tenant-unit parameter is not supported.
mtree show compression	The tenant-unit and tenant-unit parameters are not supported.
mtree show performance	The tenant-unit parameter is not supported.
net create interface	The <virtual-ifname> parameter is not supported.
net destroy	The <virtual-ifname> parameter is not supported.
perf	The vtl option is not supported on any perf command.
storage add	The enclosure and disk parameters are not supported.
storage remove	The enclosure and disk parameters are not supported.
storage show	The archive option is not supported.
system show stats	NVRAM statistics are not reported, because DDVE systems do not have physical NVRAM.
quota	The tenant-unit parameter is not supported.
replication	MTree replication is the only type of replication supported.

Table 20 Modified DD OS commands (continued)

Command	Changes
snapshot	The <code>tenant-unit</code> parameter is not supported.

Unsupported DD OS commands

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

Table 21 Unsupported commands and command options

Unsupported command or command option	Notes
<code>adminaccess https generate certificate</code>	Deprecated. Use <code>adminaccess certificate generate</code> instead.
<code>alerts add</code>	Deprecated. Use <code>alerts notify-list add</code> instead.
<code>alerts del</code>	Deprecated. Use <code>alerts notify-list del</code> instead.
<code>alerts notify-list option set <i>group-name</i> tenant-alert-summary {enabled disabled}</code>	
<code>alerts notify-list option reset <i>group-name</i> tenant-alert-summary</code>	
<code>alerts reset</code>	Deprecated. Use <code>alerts notify-list reset</code> instead.
<code>alerts show alerts-list</code>	Deprecated. Use <code>alerts notify-list show</code> instead.
<code>alerts test</code>	Deprecated. Use <code>alerts notify-list test</code> instead.
<code>archive</code>	
<code>authorization</code>	
<code>autosupport display</code>	Deprecated. Use <code>autosupport show report</code> instead.
<code>autosupport reset support-list</code>	Deprecated. Use <code>autosupport reset { all alert-summary asup-detailed support-notify }</code> instead.
<code>autosupport show support-list</code>	Deprecated. Use <code>autosupport show { all asup-detailed alert-summary support-notify }</code> instead.
<code>cifs set authentication nt4</code>	Deprecated. Use <code>cifs set authentication active-directory</code> instead.
<code>cluster</code>	
<code>ddboost fc</code>	
<code>ddboost option reset fc</code>	
<code>ddboost option set distributed-segment-processing disabled</code>	Turning off distributed segment processing (DSP) with this DDBoost command is not supported for DDVE on DD OS 6.1.2.x.

Table 21 Unsupported commands and command options (continued)

Unsupported command or command option	Notes
<code>ddboost option show</code>	Turning off DSP with this DDBoost command is not supported for DDVE on DD OS 6.1.2.x.
<code>ddboost option show fc</code>	
<code>ddboost show image-duplication</code>	Deprecated. Use <code>ddboost file-replication show</code> instead.
<code>ddboost user option set user default-tenant-unit <i>tenant-unit</i></code>	
<code>ddboost user option reset user [default-tenant-unit]</code>	
<code>disk add devdisk-id [spindle-group 1-16]</code>	Deprecated. Use <code>storage add</code> instead.
<code>disk add enclosure <i>enclosure-id</i></code>	Deprecated. Use <code>storage add</code> instead.
<code>disk benchmark start</code>	Not supported by DDVE in cloud
<code>disk benchmark show</code>	Not supported by DDVE in cloud
<code>disk benchmark stop</code>	Not supported by DDVE in cloud
<code>disk benchmark watch</code>	Not supported by DDVE in cloud
<code>disk expand</code>	Deprecated. Use <code>storage add</code> instead.
<code>disk fail<i>enclosure-id.disk-id</i></code>	
<code>disk multipath</code>	
<code>disk port</code>	
<code>disk rescan [<i>enclosure-id.disk-id</i>]</code>	
<code>disk show detailed-raid-info</code>	Deprecated. Use <code>disk show state</code> and <code>storage show</code> instead.
<code>disk show failure-history</code>	
<code>disk show performance</code>	Not supported by DDVE in cloud
<code>disk show raid-info</code>	Deprecated. Use <code>disk show state</code> and <code>storage show</code> instead.
<code>disk show reliability-data</code>	
<code>disk disk show stats</code>	Not supported by DDVE in cloud
<code>disk unfail</code>	
<code>enclosure beacon</code>	
<code>enclosure show all [<i>enclosure</i>]</code>	This command is supported, but not with the <i>enclosure</i> argument.
<code>enclosure show chassis</code>	
<code>enclosure show controllers <i>enclosure</i></code>	This command is supported, but not with the <i>enclosure</i> argument.

Table 21 Unsupported commands and command options (continued)

Unsupported command or command option	Notes
<code>enclosure show cpus [enclosure]</code>	This command is supported, but not with the <i>enclosure</i> argument.
<code>enclosure show fans</code>	
<code>enclosure show io-cards [enclosure]</code>	This command is supported, but not with the <i>enclosure</i> argument.
<code>enclosure show memory [enclosure]</code>	This command is supported, but not with the <i>enclosure</i> argument.
<code>enclosure show nvram</code>	
<code>enclosure show powersupply</code>	
<code>enclosure show summary</code>	
<code>enclosure show temperature-sensors</code>	
<code>enclosure show topology</code>	
<code>enclosure test topology</code>	
<code>filesystems archive</code>	
<code>filesystems clean update-stats</code>	Deprecated. Use <code>filesystems show space</code> instead.
<code>filesystems encryption</code>	
<code>filesystems encryption passphrase change</code>	Deprecated. Use <code>system passphrase change</code> instead.
<code>filesystems retention-lock</code>	Deprecated. Use <code>mtree retention-lock</code> instead.
<code>filesystems show compression tier</code>	The <code>tier</code> option is not supported.
<code>filesystems show history</code>	Deprecated. Use <code>filesystems show compression daily</code> instead.
<code>ha create</code>	Not supported by DDVE in cloud
<code>ha destroy</code>	Not supported by DDVE in cloud
<code>ha status</code>	Not supported by DDVE in cloud
<code>ha failover</code>	Not supported by DDVE in cloud
<code>ha online</code>	Not supported by DDVE in cloud
<code>ha offline</code>	Not supported by DDVE in cloud
<code>license</code>	The <code>license</code> commands are not supported because DDVE uses new <code>elicense</code> commands.
<code>mtree show compression mtree_path tier</code>	
<code>net aggregate</code>	
<code>net config ifname type cluster</code>	
<code>net create interface virtual-ifname</code>	

Table 21 Unsupported commands and command options (continued)

Unsupported command or command option	Notes
net create interface <i>physical-ifname</i> vlan <i>vlan-id</i>	
net create virtual <i>vethid</i>	
net destroy <i>virtual-ifname</i>	
net destroy <i>vlan-ifname</i>	
net failover	
net modify <i>virtual-ifname</i> bonding {aggregate failover	
net set portnaming	
ndmp	
ndmpd	
nfs option disable report-replica-as-writable	Deprecated. Use filesys option disable report-replica-as-writable instead.
nfs option enable report-replica-as-writable	Deprecated. Use filesys option enable report-replica-as-writable instead.
nfs option reset report-replica-as-writable	Deprecated. Use filesys option reset report-replica-as-writable instead.
nfs option show report-replica-as-writable	Deprecated. Use filesys option show report-replica-as-writable instead.
perf * module vtl	
san	
shelf migration start	Not supported by DDVE in cloud
shelf migration status	Not supported by DDVE in cloud
shelf migration suspend	Not supported by DDVE in cloud
shelf migration resume	Not supported by DDVE in cloud
shelf migration precheck	Not supported by DDVE in cloud
shelf migration option	Not supported by DDVE in cloud
shelf migration finalize	Not supported by DDVE in cloud
shelf migration show history	Not supported by DDVE in cloud
snapshot add schedule <i>name</i> [days <i>days</i>] time <i>time</i> [, <i>time...</i>] [retention <i>period</i>]	Deprecated. Use snapshot schedule create instead.
snapshot add schedule <i>name</i> [days <i>days</i>] time <i>time</i> every <i>mins</i> [retention <i>period</i>]	Deprecated. Use snapshot schedule create instead.
snapshot add schedule <i>name</i> [days <i>days</i>] time <i>time-time</i> [every <i>hrs</i> <i>mins</i>] [retention <i>period</i>]	Deprecated. Use snapshot schedule create instead.

Table 21 Unsupported commands and command options (continued)

Unsupported command or command option	Notes
<code>snapshot del schedule {name all}</code>	Deprecated. Use <code>snapshot schedule destroy</code> instead.
<code>snapshot modify schedule name {[days days] time time [,time...]} [retention period]}</code>	Deprecated. Use <code>snapshot schedule modify</code> instead.
<code>snapshot modify schedule name {[days days] time time every {mins none} [retention period]}</code>	Deprecated. Use <code>snapshot schedule modify</code> instead.
<code>snapshot modify schedule name {[days days] time time-time [every {hrs mins none}]} [retention period]}</code>	Deprecated. Use <code>snapshot schedule modify</code> instead.
<code>snapshot reset schedule</code>	Deprecated. Use <code>snapshot schedule reset</code> instead.
<code>snapshot show schedule</code>	Deprecated. Use <code>snapshot schedule show</code> instead.
<code>storage add enclosure enclosure-id</code>	
<code>storage add disk enclosure-id.disk-id</code>	
<code>storage remove enclosure enclosure-id</code>	
<code>storage remove disk enclosure_id.disk-id</code>	
<code>system firmware</code>	
<code>system option set console</code>	
<code>system retention-lock</code>	
<code>system sanitize</code>	
<code>system show anaconda</code>	
<code>system show controller-inventory</code>	
<code>system show nvram</code>	
<code>system show nvram-detailed</code>	
<code>system show oemid</code>	
<code>system upgrade continue</code>	
<code>user</code>	
<code>user change priv</code>	Deprecated, with no replacement.
<code>vserver config set host</code>	Not supported by DDVE in cloud
<code>vserver config reset</code>	Not supported by DDVE in cloud
<code>vserver config show</code>	Not supported by DDVE in cloud
<code>vserver config perf-stats start</code>	Not supported by DDVE in cloud
<code>vserver config perf-stats stop</code>	Not supported by DDVE in cloud
<code>vserver config perf-stats status</code>	Not supported by DDVE in cloud

Table 21 Unsupported commands and command options (continued)

Unsupported command or command option	Notes
<code>vtl lunmask</code>	Deprecated. Use <code>vtl group</code> instead.
<code>vtl lunmask add</code>	Deprecated. Use <code>vtl group add</code> instead.
<code>vtl lunmask del</code>	Deprecated.
<code>vtl lunmask show</code>	Deprecated. Use <code>vtl group show</code> instead.

Troubleshooting performance issues

You can check DDVE performance statistics as follows:

- With the native tools available in VMware vCenter or ESXi, or Microsoft Hyper-V.

You can also use the following to monitor benchmark performance:

- `perf show`
- `disk benchmark`

[Extensions to DDOS for DDVE](#) on page 50 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.
- The memory swapping value should always be zero. If it is not, there is a memory resource contention on the hypervisor host, which is likely to have a severe impact on DDVE performance.

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.

i **Note:** The controls and names for these statistics and counters might be different in some versions of the vSphere Client and between VMware and Microsoft hypervisors. See your hypervisor documentation for help displaying these statistics in your environment.