Data ONTAP® Edge 8.2

Installation and Administration Guide

Contents

Introduction to Data ONTAP Edge

The NetApp Data ONTAP Edge family of products are storage solutions designed for remote offices. In addition to managing storage and protecting data, they are configured to use NetApp SnapVault and SnapMirror technology to automatically copy and move data to a central-site NetApp storage system where it can be archived or used for disaster recovery.

Data ONTAP Edge products use Data ONTAP-v technology to run Data ONTAP storage software in a virtual machine on a high-performance server. This enables Data ONTAP to manage the local storage for applications running on other virtual machines on the same server.

This guide uses the family name Data ONTAP Edge when describing functionality provided by both the Data ONTAP Edge and Data ONTAP Edge-T products. When functionality is unique for one of the products, the individual names are used. The name Data ONTAP-v is used when describing the functionality of the underlying platform technology.

What Data ONTAP-v storage software is

Data ONTAP-v is a software version of a storage controller that executes Data ONTAP within a virtual machine. This enables Data ONTAP to run on servers supported by VMware vSphere so as to manage storage in virtualized environments.

By enabling Data ONTAP to run on standard servers, smaller data centers can achieve storage management and protection capabilities similar to those offered by hardware-based NetApp storage controllers.

To deploy Data ONTAP-v storage software on a host computer, and to manage it as a platform, NetApp has developed the Data ONTAP-v administration tool, called *dvadmin*. dvadmin must be used to install Data ONTAP Edge.

Data ONTAP Edge functionality

Data ONTAP Edge systems are configured with specific Data ONTAP features to provide a unique storage solution.

The Data ONTAP feature licenses provided with Data ONTAP Edge systems include:

- SnapVault (primary)
- SnapRestore
- FlexClone
- CIFS, iSCSI, and NFS

As shown in the figure below, Data ONTAP Edge systems use Data ONTAP-v to manage the local storage for applications running on other virtual machines on the same server. The Data ONTAP Edge systems use SnapVault to archive data to the NetApp storage system at the main data center.
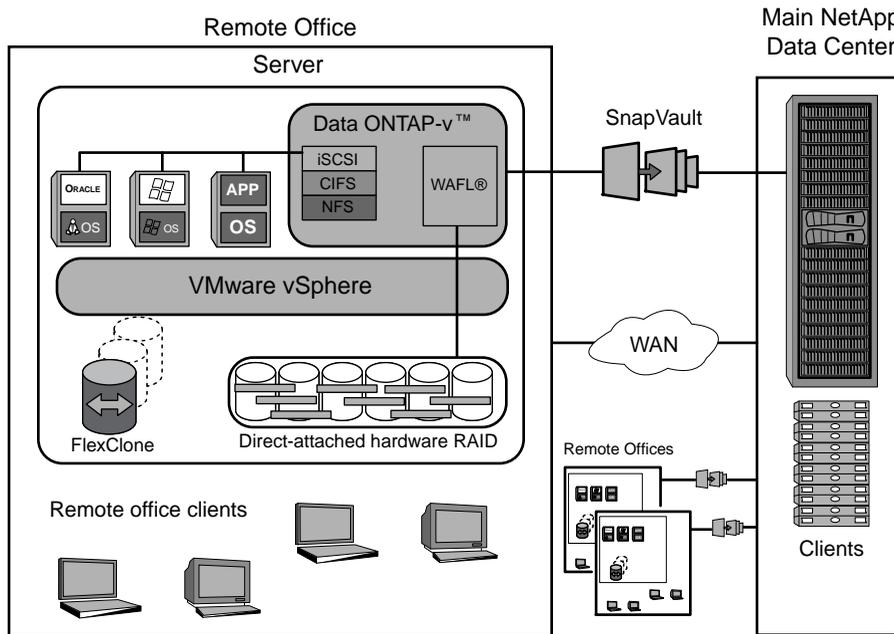
See the *Data ONTAP Data Protection Online Backup and Recovery Guide for 7-Mode* for information about SnapVault and SnapRestore functionality.

Data ONTAP Edge-T functionality

Data ONTAP Edge-T systems are configured with specific Data ONTAP features to provide a unique storage solution.

The Data ONTAP feature licenses provided with Data ONTAP Edge-T systems include:

• SnapMirror
• SnapVault (both primary and secondary)
• SnapRestore
• FlexClone
• CIFS, iSCSI, and NFS

As shown in the figure below, Data ONTAP Edge-T systems use Data ONTAP-v to manage the local storage for applications running on other virtual machines on the same server. The Data ONTAP Edge-T systems use SnapMirror to replicate data from specified source volumes or qtrees to specified destination volumes or qtrees, respectively.
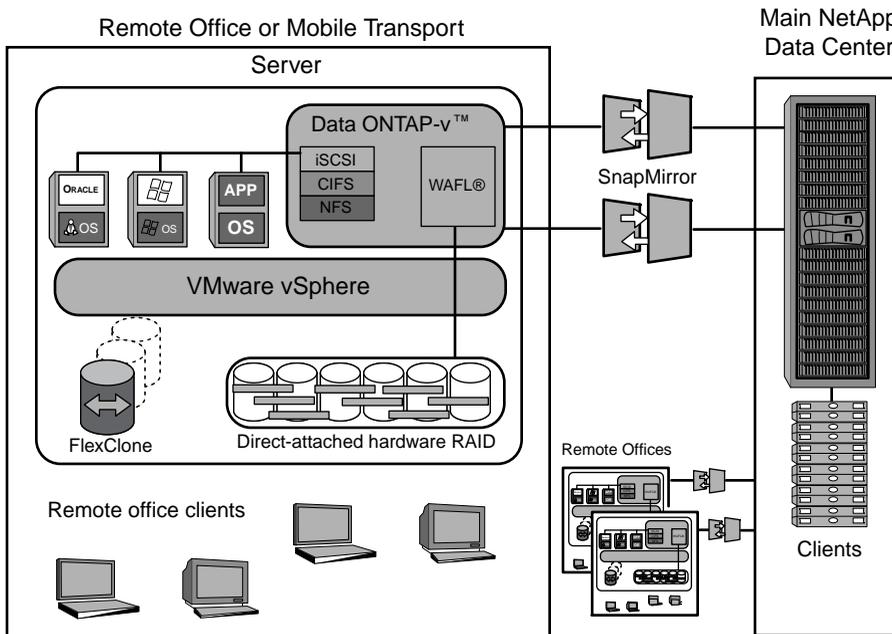
See the *Data ONTAP Data Protection Online Backup and Recovery Guide for 7-Mode* for information about SnapMirror, SnapVault, and SnapRestore functionality.

SnapVault considerations when using Data ONTAP Edge storage systems

If you are using SnapVault with Data ONTAP Edge, there are limitations and considerations of which you should be aware.

Note: These limitations and considerations apply to Data ONTAP Edge systems, but not to Data ONTAP Edge-T systems. Data ONTAP Edge-T can function as a SnapVault primary or as a SnapVault secondary.

Consider the following when using SnapVault on Data ONTAP Edge storage systems:

• A Data ONTAP Edge system can be configured only as a SnapVault primary system, not as a SnapVault secondary system.
• SnapVault primary is supported only when paired with a NetApp storage system configured as a SnapVault secondary system.
• After you start Data ONTAP Edge the first time, you must establish a connection to the SnapVault secondary system within 72 hours or the system will be shut down.

See the *Data ONTAP Data Protection Online Backup and Recovery Guide for 7-Mode* for SnapVault setup and configuration information using the CLI. You can also use OnCommand System Manager to configure SnapVault on the primary and secondary storage systems.

What is different in a Data ONTAP Edge storage system

A Data ONTAP Edge storage system runs Data ONTAP software on a virtual machine, so it can be looked at as a software controller.

A software controller is different from a typical hardware controller in the following areas:

Environment

Data ONTAP Edge can be installed on an x86 computer server. It provides the storage solution for any server applications that can access the server, including virtual machines residing on the local server.

Storage

Storage is currently limited to the disks that are physically installed in the same server environment and that are available to VMware vSphere. Note that Data ONTAP Edge systems can be configured with a maximum of 10 TB total storage capacity.

Physical controller management

The Data ONTAP-v administration tool (called dvadmin) is used for management of the software controller. dvadmin provides the ability to:

- install Data ONTAP Edge (the Data ONTAP-v virtual machine)
- configure Data ONTAP setup values
- start the virtual machine (and boot Data ONTAP at the same time)
- monitor, and report on, the virtual machine operating state
- backup and restore Data ONTAP-v configuration information
- interact with, and monitor activity on, the Data ONTAP console
- create additional data disks to be managed by Data ONTAP

NVRAM

NVRAM (non-volatile random access memory) is used by Data ONTAP to store information that is expected to survive a power outage. The NVRAM implementation requires the availability of a hardware RAID controller with a battery-backed write cache instead of a physical NVRAM card. When used this way, it is referred to as "virtual" NVRAM.

Licensing

Unlike a hardware controller, a valid Data ONTAP-v platform license must be specified when you install the Data ONTAP Edge storage system. After installation, you can add Data ONTAP feature licenses just as you would on a hardware controller.

Because of the virtualized environment, there are some restrictions as to which Data ONTAP features can be used. See *Data ONTAP-v supported and unsupported functionality* on page 62 for a list of supported and unsupported Data ONTAP features.

How Data ONTAP Edge uses storage

Data ONTAP Edge virtualizes storage from the disks that are available to the host server. In a rack system this can be all the disks within the chassis, while in a blade system this could be one or more storage blades in the same blade server.

A brief description of the storage terminology used in the Data ONTAP Edge storage system environment is provided below:

- *physical disk* - the disk, or disks, that are available to the host server. The disks are assigned to RAID groups and presented to the host server as LUNs.
- *storage pool* - a collection of LUNs that hold virtual machine files. The space in the defined pool, or pools, can be used by Data ONTAP Edge for system information or for data storage. From the perspective of a VMware infrastructure, a storage pool is synonymous with a datastore.
- *virtual disk* - the defined space that Data ONTAP Edge sees as an actual disk. Multiple virtual disks can exist within a storage pool. These disks are formatted and managed by the hypervisor, for example, created as Virtual Machine Disks (VMDKs) when using VMware. The virtual disks are used by Data ONTAP Edge as either system disks or data disks:

  - *System disks* are used internally for the Data ONTAP and virtual machine installation, and for the virtual NVRAM and system files. Three system disks are created automatically when Data ONTAP Edge is installed.
  - *Data disks* are the disks that Data ONTAP Edge manages as application storage. Multiple data disks can be created within a storage pool.

See *RAID groups and LUN configuration* on page 15 for detailed information about the recommended RAID configuration for your system.

How to interface with Data ONTAP Edge

You use the Data ONTAP-v administration tool in order to install, configure, and manage the Data ONTAP Edge storage system.

Because there is no physical serial port on the Data ONTAP-v virtual machine, you connect to both Data ONTAP-v and Data ONTAP over the network.

There are multiple ways to configure and manage Data ONTAP Edge:

- Connect to dvadmin on the Data ONTAP-v Installer virtual machine (the management VM). You can access dvadmin directly over the network using SSH, or you can use the Console tab in the vSphere Client. This enables you to use the dvadmin CLI to manage the virtual machine platform, and the system console to manage Data ONTAP.
- Connect to Data ONTAP directly over the network (using SSH, for example) and use the Data ONTAP command-line interface or System Manager to manage the storage system.

The figure below shows the two different ways to interface with the Data ONTAP Edge storage software.
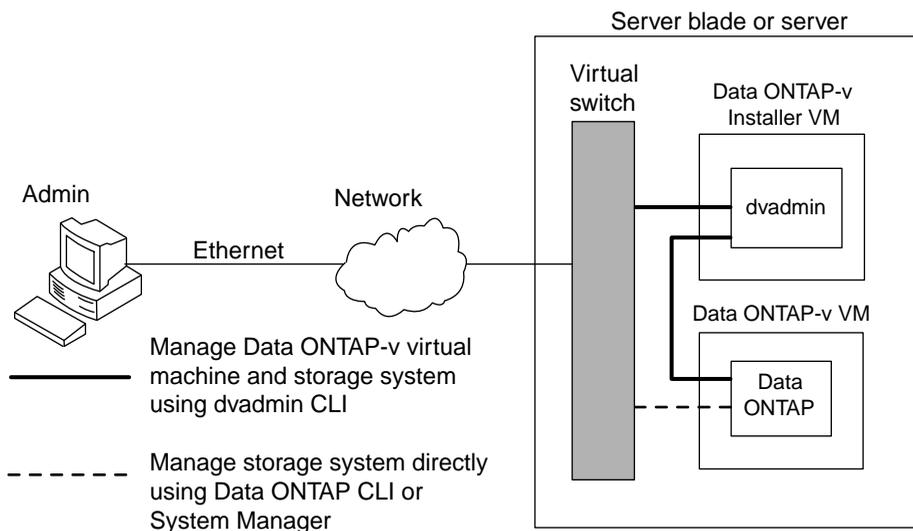
Data ONTAP Edge and Data ONTAP administration

Management of your Data ONTAP Edge storage system is accomplished by using both the dvadmin command-line interface and the Data ONTAP management interfaces.

Data ONTAP is the operating system for all NetApp storage systems. It provides a complete set of storage management tools through its command-line interface and graphical System Manager interface.

The management tasks that you can perform with each tool are described below.

dvadmin tasks:

- Installing Data ONTAP Edge (which creates the Data ONTAP-v virtual machine and installs Data ONTAP software)
- Licensing Data ONTAP-v as a platform
- Creating storage pools from the available LUNs
- Creating virtual data disks from the storage pools
- Starting and stopping the Data ONTAP Edge virtual machine (this acts as an on/off switch for your storage system)
- Backing up and restoring Data ONTAP Edge system information
- Connecting to the Data ONTAP system console to configure the storage system using Data ONTAP commands

Data ONTAP administration tasks:

• Configuring licensed Data ONTAP features
• Setting up the data disks, creating aggregates and volumes
• Backing up and restoring Data ONTAP information
• Upgrading Data ONTAP software
• All other Data ONTAP activities...

Typically you will use dvadmin to install and configure Data ONTAP Edge, and then you will use Data ONTAP administration tools to configure and manage Data ONTAP on the virtual machine platform.

Data ONTAP Edge licensing

Unlike a NetApp hardware controller, Data ONTAP Edge must be licensed separately as a platform. You must specify a valid Data ONTAP-v platform license when you first install Data ONTAP Edge onto a host server.

You will receive the *platform license* with your Data ONTAP Edge order so it can be used during the installation. The Data ONTAP-v platform license defines the system as a Data ONTAP Edge (CBvM100) or Data ONTAP Edge-T (FDvM100) storage system.

Data ONTAP *feature licenses* enable support for specific Data ONTAP features. Feature licenses for CIFS, NFS, iSCSI, FlexClone, SnapRestore, and SnapVault are added automatically when you install the Data ONTAP Edge or Data ONTAP Edge-T software. (With Data ONTAP Edge-T systems you must add the SnapMirror license manually during installation.)

Because each Data ONTAP-v virtual machine is licensed separately and locked to a specific host server, no cloning or vMotion of the Data ONTAP-v virtual machine is allowed. If the Data ONTAP-v software is booted on a different virtual machine than the one on which it was initially installed, or if the license is not valid, Data ONTAP logs an error message and shuts down.

Note: Data ONTAP feature licenses provided with Data ONTAP Edge are valid only on Data ONTAP Edge systems. Those feature licenses cannot be used on hardware controllers. Similarly, Data ONTAP feature licenses created for a hardware controller cannot be used on a Data ONTAP Edge system.

See the *Data ONTAP System Administration Guide for 7-Mode* for information about installing Data ONTAP feature licenses.

Viewing license and model information

You can view Data ONTAP Edge model and license information from the dvadmin console and from the Data ONTAP system console. The model is determined by the platform license key used during installation.

The Data ONTAP Edge platform license can be displayed from the dvadmin command line using the `vm prop show` command:

```
> vm prop show dotv1

checksum_type = zoned
gateway = 10.97.128.1
hostname = host_system_1
ipaddr = 10.97.131.27
license = XXXX-YYYY-ZZZZ-AAAA-BBBB
netmask = 255.255.248.0
password = *********
...
```

The Data ONTAP Edge Model Name, Serial Number, System ID, and other pertinent information can be displayed from the Data ONTAP console using the sysconfig -av command:

```
DOT1> sysconfig -av
        NetApp Release 8.x.x 7-Mode: Fri Feb 22 03:19:52 PDT 2013
        System ID: 2194434981 (host_system_1)
        System Serial Number: 2006000000015 (host_system_1)
        System Storage Configuration: Single Path
        System ACP Connectivity: NA
        slot 0: System Board 2.6 GHz (Virtual Machine)
                Model Name:        CBvM100
                Serial Number:     221901
                Loader version:    1.0
                Processors:        2
                Memory Size:       4096 MB
                Memory Attributes: None
                Virtual NVRAM Size: 256 MB
...
```

Note: For a Data ONTAP Edge-T system the Model Name will be FDvM100, and the Serial Number will begin with "2008...".

The Serial Number and System ID can also be displayed using the dvadmin vm show command:

```
> vm show dotv1
VM Name        Power  CfgState  Heartbeat  Hostname       IP Address
dotv1          on     ready     green      host_system_1  10.97.131.27

VM Version  Data ONTAP Version  Serial Number   System ID
1.x         8.x.x               2006000000015   2194434981
...
...
```

Data ONTAP-v support information

Not all Data ONTAP releases support the same features or configurations. See the *Data ONTAP Release Notes for 7-Mode* for complete information.

Data ONTAP Edge planning overview

Successful implementation of a Data ONTAP Edge installation requires careful planning and proper installation and configuration of all hardware and software components.

Overview of installation and configuration steps

This section describes how to install and configure Data ONTAP Edge.

The table below provides a brief description of the tasks that you need to perform in order to install and configure your storage system.

Task	See the following section, chapter, or guide...
Make sure your hardware platform and server meet all the prerequisites, and that the server BIOS has been configured properly.	*Data ONTAP Edge platform requirements* on page 14
Create RAID groups from the available disks to provide the LUNs that will be managed by Data ONTAP Edge.	*RAID groups and LUN configuration* on page 15
Download the Data ONTAP Edge software and licenses from NetApp. Then install dvadmin (the Data ONTAP-v administration tool) by deploying the Data ONTAP-v Installer virtual machine.	*Data ONTAP-v Administration Tool Installation Guide* on the NetApp Support Site at *support.netapp.com*
Install and start Data ONTAP Edge using dvadmin.	Typical installation using the dvadmin setup wizard: *Data ONTAP Edge setup and installation* on page 17 Custom installation using individual dvadmin commands: *Data ONTAP Edge advanced installation instructions* on page 45
Connect to the Data ONTAP system console to complete the configuration of your storage system. This includes configuring Data ONTAP features such as SnapVault and SnapMirror.	*Connecting to the Data ONTAP console* on page 32 Also see the NetApp Support Site at *support.netapp.com* for access to the full set of Data ONTAP documentation.

Data ONTAP Edge platform requirements

The hardware platform on which Data ONTAP Edge or Data ONTAP Edge-T is installed must meet certain system requirements and virtual machine requirements in order to work properly.

Supported platforms are listed in the Interoperability Matrix Tool at *support.netapp.com/NOW/ products/interoperability*.

You can install only one Data ONTAP-v virtual machine per ESX host. The virtual machine requires the following resources from the host server:

- 2 dedicated physical CPU cores
- 4 GB of dedicated memory
- 20 GB disk space for Data ONTAP-v system disk images and virtual machine metadata

The Data ONTAP-v virtual machine reserves two CPU cores and 4 GB of RAM from the host. You *cannot* change these settings or the storage system will not boot. Limiting resources is not supported and has not been tested. It can negatively impact the I/O capability of the storage system and could risk data loss.

Note: Data ONTAP-v does not release the CPUs when idle, so vSphere will report a high CPU warning because it sees 100% usage. You can ignore or clear the vSphere alarm for CPU usage. The Data ONTAP sysstat command displays the true usage of the CPUs.

Your server should meet or exceed the following minimum requirements:

- Quad core, or two dual-core, 64-bit Intel x86 processors
- 2.27 GHz or greater processor speed
- 8 GB or greater memory
- 4 or more physical disks on the server
- Single Gigabit Ethernet network
- Hardware RAID - Must have a battery-backed write cache

Note: Data ONTAP Edge can be configured with a maximum of 10 TB total storage capacity, but the server can contain more than this amount of storage.

The power management BIOS settings must be disabled on the server where you are going to install Data ONTAP Edge. If these BIOS settings are not set correctly, the virtual machine will install, but it will not start. See knowledgebase article 3013687 at *https://kb.netapp.com/support/* for the BIOS settings for the server you are using.

After the BIOS settings are set, they can be confirmed through the VMware vSphere Client under the Configuration tab. Active Policy must be listed as "Not supported". If this value is not correct, check the BIOS settings and restart the server.

The virtualization platform requirements include:

- VMware vSphere; including ESX and the VMware vSphere Client. A VMware vCenter Server is optional. See the Interoperability Matrix Tool at *support.netapp.com/NOW/products/interoperability* for supported versions.

If you plan to install other virtual machines on the server where Data ONTAP Edge is installed, review the following recommendations:

- Do not over-commit available memory or you will notice performance issues. Data ONTAP Edge reserves 4 GB of memory. Other virtual machines should not use memory that adds up to more than the total RAM available on the server.
- The Data ONTAP-v virtual machine must be fully booted before any other virtual machines start booting. You can set the startup order on the host through the vSphere Client under the Configuration tab.

   Tip: If you are planning to use VLAN tagging with Data ONTAP, you must enable VLAN tagging on the ESX server.

RAID groups and LUN configuration

You must create RAID groups from the disks on the server to provide the LUNs that Data ONTAP Edge will manage. Only disks local to the server platform can be used by Data ONTAP Edge.

Because the disks are connected to the server in the system, not directly to the Data ONTAP software, the virtual machine provides the storage status to Data ONTAP Edge. Data ONTAP uses RAID0 groups to optimize performance and storage utilization, so the storage system must provide the parity protection for disks.

In a rack system with one set of physical disks, you can create a single datastore or two datastores for the installation of system disks and data disks. It is best to create two LUNs and two datastores, as shown in the figure below. The disks created on LUN 1 are used for system installation, and the disks created on LUN 2 are used for data storage (and for the virtual NVRAM).
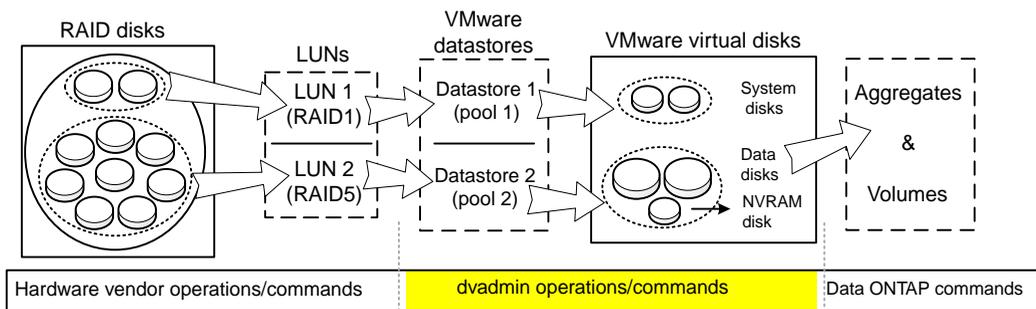
Follow these recommendations when creating the RAID groups on your system:

- Create LUNs from the RAID disks and add them to the ESX server. Ensure that the ESX server can properly see the LUNs before creating the Data ONTAP-v virtual machine. The following is the recommended configuration for creating the LUNs:

  - Create one LUN that will contain the Data ONTAP Edge system disks and configuration files. This is shown as LUN 1 in the figure. This can be a RAID1- or RAID5-backed LUN. This LUN will require a minimum of 2 or 3 disks, depending on the RAID level you decide to use.
  - Create one LUN that will contain the Data ONTAP Edge data disks and NVRAM disk. This is shown as LUN 2 in the figure. This should be a RAID5-backed LUN, and it should use all the remaining disks. The virtual NVRAM disk should be on this LUN because it contains more disks and provides better performance.

Data ONTAP Edge setup and installation

This section describes the prerequisites that must be met before installing Data ONTAP Edge, and the steps for installing Data ONTAP Edge. The Data ONTAP Edge installation deploys a complete storage appliance, including the virtual machine and Data ONTAP software, onto the host server.

Data ONTAP Edge can be installed after dvadmin has been installed and required storage pools have been created on the host server.

Note: Each Data ONTAP Edge system should be managed by only one instance of dvadmin.

Important: The VMware vSphere Client can be used to monitor the Data ONTAP-v virtual machine, but it should not be used to perform any configuration operations. If you select the Console tab, it displays a message that you must use the serial console for console access to the virtual machine.

The topics described in this section are:

- Data ONTAP Edge prerequisites
- Required configuration information
- Connecting dvadmin to the host server
- Creating required storage pools
- Installing Data ONTAP Edge using the dvadmin setup wizard
- Connecting to the Data ONTAP storage system

Data ONTAP Edge prerequisites

Before installing Data ONTAP Edge, the host server has to be prepared to host the Data ONTAP-v virtual machine.

Preparing the host includes the following steps:

- Create the virtual machine network (or networks) to which the Data ONTAP-v virtual machine network adapters will be connected.
- Create LUNs from the RAID disks and add them to the ESX server as described in *RAID groups and LUN configuration* on page 15. Ensure that the ESX server can properly see the LUNs before creating the Data ONTAP-v virtual machine.
- Create datastores (pools) on the LUNs for storing the Data ONTAP Edge system disks and data disks. See *Creating required storage pools* on page 23 for more details about this procedure:
  - Create one datastore on the smaller RAID1/RAID5 LUN for the Data ONTAP-v virtual machine and system disks.
  - Create one datastore on the large RAID5 LUN for the Data ONTAP Edge data disks and virtual NVRAM.

See *RAID groups and LUN configuration* on page 15 for a diagram that shows how the RAID disks are separated into LUNs, datastores, and virtual disks.

Required configuration information

Before starting the Data ONTAP Edge installation, you should complete the following configuration worksheet. This information is required during the software setup process.

Some of this information is required for connecting to the host server, some is required for installing the Data ONTAP Edge system on the host server, and some is required for pre-configuring Data ONTAP when you initially start the Data ONTAP Edge system.

On a NetApp hardware platform, the Data ONTAP installation often requires a separate setup process. By providing the required setup information during the installation of Data ONTAP Edge, you do not need to perform the separate Data ONTAP setup steps. After you start the Data ONTAP Edge system, Data ONTAP boots normally using the values you provided.

Types of information		Your values
Host server information	Name of the ESX host where the Data ONTAP-v virtual machine will be installed [1]	
	Name of the vCenter server if the ESX host is managed by a vCenter server [2]	
	Admin login name for the vCenter server (or ESX host if not managed by a vCenter server) [1]	
	vCenter server (or ESX host) admin password [1]	
	Name of the datastore (or pool) on which the Data ONTAP-v virtual machine system files will be installed (pool_name) [1]	
	Name of the datastore (or pool) on which the Data ONTAP-v virtual NVRAM disk will be installed (nv_pool_name) [1]	

Types of information		Your values
Storage system network information	Name of the VM network that the Data ONTAP-v virtual machine will use for its network ports (network_name) [1, 3]	
	Host primary interface (e0a) IP address (ipaddr) [1, 3]	
	Second interface (e0b) IP address (iface2_ipaddr) [2, 3]	
	Third interface (e0c) IP address (iface3_ipaddr) [2, 3]	
	Fourth interface (e0d) IP address (iface4_ipaddr) [2, 3]	
	Fifth interface (e0e) IP address (iface5_ipaddr) [2, 3]	
	Sixth interface (e0f) IP address (iface6_ipaddr) [2, 3]	
	Primary interface subnet mask (netmask) [1, 3]	
	Second interface subnet mask (iface2_netmask) [2, 3]	
	Third interface subnet mask (iface3_netmask) [2, 3]	
	Fourth interface subnet mask (iface4_netmask) [2, 3]	
	Fifth interface subnet mask (iface5_netmask) [2, 3]	
	Sixth interface subnet mask (iface6_netmask) [2, 3]	
	Gateway name (gateway) [1, 3]	
	Domain Name System (DNS) domain name (dns_domainname) [2, 3]	
	DNS server address, or addresses (dns_ipaddr) [2, 3]	
	Network Information Service (NIS) domain name (nis_domainname) [2, 3]	
	NIS server address, or addresses (nis_ipaddr) [2, 3]	
Data ONTAP information	Storage system host name corresponding to the host primary IP address (hostname) [1, 3]	
	Password for the Data ONTAP root account (password). The password must be at least eight characters long, and it must contain at least one number and at least two alphabetical characters. [1, 3]	
	Time zone (tmz) [2, 3]	
	Data ONTAP Edge or Data ONTAP Edge-T platform license (license) [1, 3]	

[1.] Required information

[2.] Optional information

[3.] Information that is passed to Data ONTAP during initialization

For more information about the values that are passed to Data ONTAP, see the "Configuration worksheet" section and the "Time zones by geographical region" section of the "Time zones" appendix in the *Data ONTAP Software Setup Guide for 7-Mode*.

Default configuration properties

Some storage system properties that are not used frequently are set to default values when the Data ONTAP installation is performed through Data ONTAP-v. Additionally, features that are not supported by Data ONTAP-v cannot be set as properties.

The configuration options that are set to default values are described below:

- IPv4 addresses are used.
- Interface groups are not created.
- Network interface properties for the primary interface, and any interfaces defined in addition to the primary interface, are set to the following values:
    - Media type is set to "auto"
    - Flow control is set to "full"
    - Jumbo frames is set to "no"
- Filer location is set to "blank".

If you want to change any of these default settings after the storage system and Data ONTAP have booted successfully, see the appropriate steps in the *Data ONTAP Network Management Guide for 7-Mode*.

The configuration options that are unavailable are described below:

- Shelf Alternate Control Path Management interface for SAS shelves is set to "no". This property cannot be set to "yes" because Data ONTAP-v does not support alternate shelves.

Note that you *can* use the OnCommand System Manager graphical interface to manage the storage system *after* the Data ONTAP Edge installation is complete.

Connecting dvadmin to the Data ONTAP Edge host server

You must connect dvadmin to the host server where the Data ONTAP Edge system will be installed before you can install the storage system.

About this task

There are three ways to connect dvadmin to a VMware ESX host:

- You can connect directly to the ESX host (provided it is not being managed by a vCenter Server).

- You can connect to the ESX host through the VMware vCenter Server that is managing the host.
- You can connect to the vCenter Server without specifying an ESX host. Once logged in, you use the dvadmin `host` command to connect to an ESX host. This method allows you to use a single instance of dvadmin to manage multiple Data ONTAP Edge systems that reside in the same vCenter.

   Note: VMware recommends against connecting directly to an ESX host if it is being managed by a vCenter Server because that can result in corruption of virtual machine configuration data.

To connect to a vCenter Server or an ESX host, you specify the information you recorded in the configuration worksheet in the "Required configuration information" topic. The Data ONTAP-v Installer provides different prompts depending on whether you are connecting to the ESX host through a vCenter Server or connecting directly to the ESX host.

If you want to save the server login information so that you do not need to re-enter it every time you connect, answer **y** to the final prompt `Do you want to save this vCenter server login information [y]:`. This option writes the server name, host name, and user name to the startup file `$HOME/.dvadmin`. The password, once correctly entered, will be stored in the VMware credential store.

Steps

1. If you are not already running dvadmin through the Data ONTAP-v Installer virtual machine, log in to the Data ONTAP-v Installer now.

    See the *Data ONTAP-v Administration Tool Installation Guide* for more information.

2. The Data ONTAP-v Installer displays the following prompt:

    ```
    The following prompts define the connection to the vCenter server
    or ESX host.
    Is the ESX host managed by a vCenter server? [y]:
    ```

3. Enter **y** if the ESX host is managed by a vCenter server, or **n** if it is not managed by a vCenter server.

    The following prompts are displayed if you connect to the ESX host through a vCenter server:

    ```
    Enter vCenter server name or IP address:
    Enter ESX host name or IP address (optional):
    Enter vCenter server username:
    Enter vCenter server password:
    ```

    The following prompts are displayed if you connect directly to the ESX host:

    ```
    Enter ESX host name or IP address:
    Enter ESX host username:
    Enter ESX host password:
    ```

4. Enter the vCenter server and/or ESX host information to define the ESX host to which you want to connect.

   Note: If the username contains special characters, then you must double-quote the username, for example, "DOMAIN\username".

   The following prompt is displayed:

   ```
   Do you want to save this server login information [y]:
   ```

5. If you want to save the server login information so that you do not need to re-enter it every time you connect, answer **y**, otherwise, enter **n**.

   You are logged into the server and the dvadmin prompt is displayed:

   ```
   NetApp Data ONTAP-v Administration Tool 1.x.x
   Copyright (C) 1992-2013 NetApp.
   All rights reserved.
   Logging in Administrator@vcenter_server1
   VMware SDK version: 5.0
   Console escape key: ^]
   Host: host_system1
   Installer Version: 8.x.x.1yy

   dvadmin>
   ```

Examples of logging into a server

The following command logs you into the ESX server named "host_system1" through the vCenter server named "vcenter_server1".

```
Is the ESX host managed by a vCenter server? [y]: y
Enter vCenter server name or IP address: vcenter_server1
Enter ESX host name or IP address (optional): host_system1
Enter vCenter server username: esxuser
Enter vCenter server password: *******
Do you want to save this vCenter server login information [y]: y
```

The following example shows how you might log into the vCenter server named "vcenter_server1" without specifying an ESX host.

```
Is the ESX host managed by a vCenter server? [y]: y
Enter vCenter server name or IP address: vcenter_server1
Enter ESX host name or IP address (optional): <Enter>
Enter vCenter server username: esxuser
Enter vCenter server password: *******
Do you want to save this vCenter server login information [y]: y
```

The following command logs you into the ESX server with the IP address 126.127.128.129.

```
Is the ESX host managed by a vCenter server? [y]: n
Enter ESX host name or IP address: 126.127.128.129
Enter ESX host username: esxuser
Enter ESX host password: *******
Do you want to save this ESX server login information [y]: y
```

After you finish

After you are logged into the host server, you can use the dvadmin command line interface (CLI) to install and manage the Data ONTAP Edge system.

Note: If the remote host key for SSH access to the ESX server is not cached in your known_hosts file, it will be added automatically the first time you connect to the server.

Creating required storage pools

You must have a minimum of two storage pools available before installing the Data ONTAP Edge system. A storage pool is equivalent to a VMware datastore; both are storage containers for files.

Before you begin

dvadmin must be connected to a host before issuing the commands described in this task. If you connected dvadmin to a vCenter Server, you must issue the host <hostname> command before creating storage pools.

You should enter the pdisk show command to view the canonical names of the available LUNs before adding a storage pool. The canonical name is typically in a format such as "naa. 60a9800043346c422f34627876694542", but the command examples in this topic use simpler names.

Note: The datastore (pool) on which you plan to deploy Data ONTAP Edge must have a unique name within the vCenter Server. If the name is not unique, you will receive an "HTTP lease" error during installation.

About this task

One of the pools will be used as the location where the Data ONTAP Edge virtual machine and system disks will be installed. This pool must exist on the smaller RAID1/RAID5 LUN that you created. If a pool (datastore) with adequate space (for example, the pool where ESX was installed) already exists, you can use that pool.

The other pool will be used as the location where the Data ONTAP Edge virtual NVRAM system disk and data disks will be installed. Core dumps will also be written to this location. This pool must be created on a storage device that consists of a battery-backed write cache. You should use the large RAID5 LUN you created on the RAID disks for this purpose. Because the virtual NVRAM disk and core dumps can take up to 10 GB, you can use the remainder of this pool as a data disk (or disks).

If you created other LUNs that you plan to use for Data ONTAP Edge data disks, you should also create pools on those LUNs at this time.

Note: You can create the storage pools (datastores) using the vSphere Client instead of using the dvadmin commands described in this topic.

Step

1. Create a storage pool on a physical disk or LUN using the following command:

   pool create <pool_name> <canonical_name>

   - `<pool_name>` is the name of storage pool you want to create.
   - `<canonical_name>` is the canonical name of the LUN that will be used for the storage pool.

Examples of adding storage pools

The following command adds the storage pool "nvram_data_pool" using storage from the RAID LUN named "LUN_xyz". This pool name is being used because it is the pool in which the virtual NVRAM and the data disks will be created.

```
 > pool create nvram_data_pool LUN_xyz
```

The following command adds the storage pool "datastore1" using storage from the RAID LUN named "LUN_abc". If a pool for system files already exists, you do not need to create a second pool.

```
 > pool create datastore1 LUN_abc
```

After you finish

After you have defined the storage pools, you can install Data ONTAP Edge.

Installing Data ONTAP Edge using the dvadmin setup wizard

The dvadmin setup wizard provides an easy way to create and start a Data ONTAP Edge storage system.

Before you begin

You should have completed the *Required configuration information* on page 18 before starting the setup wizard so that you have all the necessary configuration elements written down.

About this task

The dvadmin setup wizard prompts you for all the configuration information that will define your Data ONTAP Edge storage system. The setup wizard replaces many individual dvadmin commands that you could use to create the virtual machine, set Data ONTAP properties, define the virtual data disks that Data ONTAP Edge will manage, and start the storage system. See *Data ONTAP Edge advanced installation instructions* on page 45 for information on installing your storage system manually using dvadmin commands.

> **Note:** When the wizard presents a default value in square brackets, such as [y], press **Enter** to accept the default value, or type **n** and press **Enter** to specify a different value.

Steps

1. Type the following command to start the setup wizard.

```
> vm setup
Welcome to the VM setup wizard!
This wizard will take you step-by-step through the process of
creating a Data ONTAP virtual machine.
Use ^C at any prompt to exit the wizard.

Loading existing VMs...
VM Name          Power  CfgState  Heartbeat  Hostname   IP Address
dvadmin_VM       on     -         green      dvspecial  10.97.131.24
Enter a name for the VM: dotv1
```

2. Enter the name you want to use for the Data ONTAP-v virtual machine, for example, "dotv1", and press **Enter**. Note that this is the name of the virtual machine, not the name of the storage system. You will define the storage system name later when you specify the hostname value.

```
Loading Storage Pools...
Pool Name            Type    Access  Capacity    Available   Backing
Store
1) datastore1        VMFS    Online  251441213    40584192   LUN_abc
2) nvram_data_pool   VMFS    Online  881111333   826152128   LUN_xyz

Enter the number corresponding to the pool where you want the virtual
machine system files to be installed: 1
```

3. Enter the number that corresponds to the storage pool in which you want to install the Data ONTAP-v virtual machine and system files and press **Enter**. For example, type **1** to select the pool named "datastore1" (the pool where ESX was installed).

```
Would you like to use the same pool for the NVRAM disk? [n]:
```

4. For best performance, install the Data ONTAP-v virtual NVRAM disk on a different storage pool than the pool where you installed the virtual machine files. This pool must be created on a storage device that includes of a battery-backed write cache. To follow the recommendation, press **Enter** to accept the default setting of **no** so you can select a different pool.

```
Loading Storage Pools...
Pool Name            Type     Access    Capacity    Available    Backing
Store
1) datastore1        VMFS     Online    251441213    40584192    LUN_abc
2) nvram_data_pool   VMFS     Online    881111333   826152128    LUN_xyz

Enter the number corresponding to the pool where you want the NVRAM
disk to be created: 2
```

5. Enter the number that corresponds to the storage pool in which you want to install the Data ONTAP-v virtual NVRAM and press **Enter**. For example, type **2** to select the pool named "nvram_data_pool".

```
Loading Networks...
Network Name               Virtual Switch
1) Lab7-10.97.105           vSwitch0 (804)
2) network_1                vSwitch0 (828)

Enter the number corresponding to the network you wish to use: 2
```

6. Enter the number that corresponds to the network to which the Data ONTAP-v virtual machine interfaces should be connected (typically your management network) and press **Enter**.

```
Enter your Data ONTAP-v platform license: ABCD-1234-EFGH-5678-IJKL
```

7. Enter the unique 24-character Data ONTAP-v platform license, for example, *ABCD-1234-EFGH-5678-IJKL*, and press **Enter**. The platform license defines the product that runs on top of the Data ONTAP-v platform; for example, a Data ONTAP Edge storage system.

```
Enter the hostname for the VM: storage_1
```

8. Enter the host name by which the storage system will be known on the network (this name corresponds to the primary IP address) and press **Enter**. This is also the name you will see when managing the system using Data ONTAP commands.

```
Enter the IP address for the VM: 10.10.10.10
```

9. Enter the primary Data ONTAP-v interface (e0a) IP address that you will use to communicate with your storage system and press **Enter**.

```
Enter the netmask for the VM: 255.255.255.0
```

10. Enter the primary interface subnet mask and press **Enter**.

```
Enter the gateway for the VM: 10.10.10.1
```

11. Enter the gateway that is used for network connectivity and press **Enter**.

```
Enter the password for the VM: *********
```

12. Enter the administrative password that you want to use for the Data ONTAP root account and press **Enter**. The password must be at least eight characters long, and it must contain at least one number and at least two alphabetic characters. You will use this password whenever you log into the storage system console.

```
Confirm the password: *********
```

13. Enter the password again and press **Enter**.

```
Would you like to enter vSphere host information? [y]:
```

14. The vSphere host information, which consists of the user name and password for the ESX host, is optional. When you provide this information, Data ONTAP can access the host in order to display physical host information through the Data ONTAP `sysconfig -p` command. If you do not want to enter this information, type **n** and press **Enter** to skip this step. If you do want to enter this information, press **Enter** and define these values in the following prompts:

```
Enter the vSphere username: esxuser
Enter the vSphere password: ********
Confirm the password: ********
```

15. After you define the vSphere host information, or if you skipped that step, the wizard displays the current virtual machine parameters:

```
Loading Data ONTAP-v virtual machine parameters…
VM Name: dotv1
System Pool: datastore1
NVRAM Pool: nvram_data_pool
Network Name: network1
License Key: ABCD-1234-EFGH-5678-IJKL
Hostname: storage_1
IP Address: 10.10.10.10
Netmask: 255.255.255.0
Gateway: 10.10.10.1
Password: ********
vSphere Username: esxuser
vSphere Password: ********

Would you like to create a VM with these parameters? [y]:
```

16. If any information is incorrect, type **n** and press **Enter** to halt the wizard. You will need to start the wizard again to correct any erroneous values. If all the information is correct, press **Enter** to create the Data ONTAP-v virtual machine. Creating the virtual machine can take a few minutes.

The previous 15 steps take the place of the dvadmin command `vm create dotv1 datastore1 nvram_data_pool network_1 license=ABCD-1234-EFGH-5678-IJKL hostname=storage_1 ipaddr=10.10.10.10 netmask=255.255.255.0`

```
gateway=10.10.10.1 password=xxxyyy111 vsphere_username=esxuser
vsphere_password=pswd123.
```

```
Creating VM...
Extracting and validating OVF package contents.
Creating VM dotv1 on name.company.com.
Uploading disks to VM dotv1
Marked VM disks independent-persistent
Added serial console and gdb ports
Created VM dotv1 on host name.company.com.

The following settings are optional.

The default time zone is GMT.  Would you like to select a different
time zone? [n]: y
```

17. The default time zone for the storage system is GMT. Press **Enter** to accept this default setting,
    or type **y** and press **Enter** to specify a different time zone.

```
Enter the time zone [GMT]: America/New_York
```

18. Enter the time zone for your storage system. See the "Time zones" appendix in the *Data ONTAP
    Software Setup Guide for 7-Mode* for valid values.

    This step takes the place of the dvadmin command `vm prop set tmz "America/New_York"`.

```
Your VM has been preconfigured with the following feature licenses:
CIFS, NFS, iSCSI, FlexClone, SnapRestore, SnapVault
Would you like to add any additional feature licenses? [n]:
```

19. The standard Data ONTAP feature licenses for a Data ONTAP Edge system are installed
    automatically. If you have purchased other Data ONTAP licenses, you can enter them now. Note
    that if you are installing a Data ONTAP Edge-T system, you should enter the provided
    SnapMirror license at this point.

    Press **Enter** if you have no other feature licenses to add, or type **y** and press **Enter** to specify
    additional licenses.

    This step takes the place of the dvadmin command `vm prop set
    feature_licenses=ABCD,WXYZ,LMNO`.

```
Would you like to configure additional network interfaces (up to 3
additional)? [n]: y
```

20. If you do not want to add any additional network interfaces, press **Enter** to skip this step. If you
    want to create additional network interfaces that can be used to connect to the Data ONTAP-v
    virtual machine, type **y** and press **Enter**.

```
Enter the IP address for interface 2: 10.10.10.12
```

21. Enter the IP address of the second interface (e0b).

    This step takes the place of the dvadmin command `vm prop set iface2_ipaddr 10.10.10.12`.

    ```
    Enter the netmask for interface 2: 255.255.255.0
    ```

22. Enter the subnet mask for interface 2.

    This step takes the place of the dvadmin command `vm prop set iface2_netmask 255.255.255.0`.

    ```
    Would you like to connect it to a different network? [n]:
    ```

23. If you would like to connect interface 2 to the same network to which interface 1 is connected (as defined in step 6), press **Enter**. If you want to connect interface 2 to a different network, type **y** and press **Enter** to specify the network.

    This step takes the place of the dvadmin command `vm network connect`.

    The wizard prompts if you would like to configure any additional interfaces.

    ```
    Would you like to configure additional network interfaces (up to 2
    additional)? [n]:
    ```

24. You can add up to three additional interfaces. If you do not want to add any additional network interfaces, press **Enter** to skip this step.

    ```
    Would you like to configure DNS? [n]:
    ```

25. If you would like to configure a DNS domain name and up to three DNS servers, type **y** and press **Enter** to specify the information. Press **Enter** if you do not need to configure DNS information.

    This step takes the place of the dvadmin commands `vm prop set dns_domainname` and `vm prop set dns_ipaddr`.

    ```
    Would you like to configure NIS? [n]:
    ```

26. If you would like to configure a NIS domain name and up to three NIS servers, type **y** and press **Enter** to specify the information. Press **Enter** if you do not need to configure NIS information.

    This step takes the place of the dvadmin commands `vm prop set nis_domainname` and `vm prop set nis_ipaddr`.

    The wizard displays the additional virtual machine configuration information that you have defined and asks if you want to create data disks.

    ```
    Set iface2_ipaddr = 10.10.10.12
    Set iface2_netmask = 255.255.255.0
    ```

```
Set tmz = America/New_York

Would you like to define the data disks that the VM will manage? [y]:
```

27. A data disk can consume the entire space in a storage pool, or multiple data disks can be created in a single storage pool. Press **Enter** to define the data disk that the Data ONTAP Edge system will manage.

```
Loading Storage Pools...
Pool Name           Type     Access   Capacity    Available   Backing
1) datastore1       VMFS     Online    251441213    40584192   LUN_abc
2) nvram_data_pool  VMFS     Online    881111333   826152128   LUN_xyz

Enter the number corresponding to the pool where you want the data
disk to be created: 2
```

28. Enter the number that corresponds to the storage pool in which you want to create the data disk and press **Enter**. Frequently, this is the same storage pool in which you created the virtual NVRAM disk.

```
Supported disk size for this pool: 1024 MB - 826152 MB
Would you like the disk to span the available free space (826152 MB)?
[y]:
```

29. If you would like the disk to use all the available free space in the specified pool (this is the number in the parentheses), press **Enter**. Note that a single virtual disk cannot be larger than 2 TB. If the pool is larger than 2 TB, you will need to break it up into two or more similar-size disks (up to a maximum of 10 TB for Data ONTAP Edge systems). Because this pool is only 800 GB, press **Enter** to create a disk of the full size.

```
Creating disk...
Added 826152 MB disk [0:0] backed by [nvram_data_pool] dotv1/
dotv1_3.vmdk

Would you like to add another disk? [n]:
```

30. Press **Enter** when you do not need to create any more data disks.

Steps 27 through 29 take the place of the dvadmin command `vm disk create dotv1 nvram_data_pool 800g`.

```
Would you like to enable automatic backup of your VM's configuration?
[y]:
```

31. There is a "monitor" feature available through dvadmin. It provides functionality to automatically back up the Data ONTAP-v system disks (not data disks) and configuration information. It also enables the collection of logs of input and output from the Data ONTAP system console. You should press **Enter** to enable this functionality because it makes troubleshooting and repair of the

system much easier. You can type **n** and press **Enter** if you do not want to enable this functionality.

This step takes the place of the dvadmin command `vm monitor start --no-watchdog dotv1`.

```
vm monitor for dotv1 is running with options --no-watchdog

Your VM has been configured.  Would you like to see a summary? [y]:
```

32. Press **Enter** to see a summary of the current storage system settings. This display is generated from the dvadmin command `vm show dotv1`.

```
VM Name      Power  CfgState  Heartbeat  Hostname    IP Address
dotv1        off    new       -          -           -

==============================================
Detail information for vm dotv1:
VM Version  Data ONTAP Version   Serial Number  System ID
1.x         8.x.x                -              -

Disk Name      Ctrl:Unit  Size (MB)   UUID          Backing
Hard disk 1    ide0:0        1057      -            datastore1
Hard disk 2    ide0:1        1542      -            datastore1
Hard disk 3    ide1:0        5121      -            nvram_data_pool
Hard disk 4    scsi0:0     826152    <uuid-string>  nvram_data_pool

Adapter Name         MAC Address           Network Name
Network adapter 1    00:50:56:97:08:62     VM Network
Network adapter 2    00:50:56:97:08:63     VM Network
Network adapter 3    00:50:56:97:08:64     VM Network
Network adapter 4    00:50:56:97:08:65     VM Network
Network adapter 5    00:50:56:9c:3b:a2     VM Network
Network adapter 6    00:50:56:9c:34:f5     VM Network

Serial Name       Port  Conn  Status        Details
Serial port 1      0     N     untried       Remote tcp://:7209
Serial port 2      1     N     untried       Pipe dotv1_serial_1

Resource        Reservation
CPU             5332 MHz
Memory          4096 MB

Would you like to start the VM? [y]:
```

33. If the disk and network adapter values you defined are correct, press **Enter** to start the Data ONTAP Edge storage system. Note that the "scsi" disk size should match the size of the data disk that you defined earlier.

This step takes the place of the dvadmin command `vm start dotv1`.

Important: If you do not start the storage system using the setup wizard, make sure you use the dvadmin `vm start` command to start the system the first time. **Do not** start the system the first time using VMware commands or the VMware vSphere Client.

```
start VM dotv1

VM wizard is now complete!  You can connect to your VM by typing
'vm console connect dotv1', or type 'help' to view the available
commands.
>
```

34. You are done, and your storage system will be available to use after it has completed booting up. You can optionally enter the command `vm console connect dotv1` to connect to the Data ONTAP console to watch the storage system startup process.

Connecting to the Data ONTAP Edge storage system console

You connect to the Data ONTAP Edge console in order to interface with Data ONTAP to administer your storage system. The console enables you to use the Data ONTAP command line interface.

About this task

You can connect to your Data ONTAP Edge storage system using a dvadmin command. You can also connect to the storage system using other methods:

- An SSH client, such as PuTTY, can be used to connect directly to the primary IP address (e0a) of the storage system, for example `ssh -l root 10.10.10.10`.
- NetApp OnCommand System Manager can be used to administer the storage system using the primary IP address. See the NetApp Support Site at *support.netapp.com* to access System Manager software.

You can have only one dvadmin console connection to a storage system at a time. However, you can have a dvadmin console connection and an SSH or System Manager connection concurrently.

Note that this command could fail with `Error: [85] VmSerialConnectErr` depending on the ESX firewall setting. The ESX firewall either needs to be disabled, or the firewall rule for "remoteSerialPort" needs to be enabled. For example, in vSphere 5, select the host through the vSphere Client and select **Configuration > Security Profile > Firewall Properties** and make sure the check box is selected for **VM Serial port connected over network**.

Steps

1. Enter the following command to connect to the storage system console for a specific Data ONTAP Edge system:

vm console connect <vm_name>

2. Enter the Data ONTAP root password, and then you can configure Data ONTAP settings.

Example console access

The following example shows how to access the storage system console for the Data ONTAP Edge system named "dotv1":

```
> vm console connect dotv1

Connecting to console on dotv1. Use ^]-x to exit or ^]-h for help.
[connecting]
[connected]
Password: ********
storage1>
```

To exit the console and return to the dvadmin prompt, use the escape key sequence `Ctrl-]x` (press the "Ctrl' and "right bracket" keys together, then press the "X" key).

After you finish

To confirm that Data ONTAP has started successfully, you can run the Data ONTAP `aggr status -r` command, as shown below:

```
storage1> aggr status -r
Aggregate aggr0 (online, raid0) (advanced_zoned checksums)
 Plex /aggr0/plex0 (online, normal, active)
  RAID group /aggr0/plex0/rg0 (normal, advanced_zoned checksums)

  RAID Disk Device  HA  SHELF BAY CHAN Pool Type  RPM  Used (MB/blks)    Phys (MB/blks)
  --------- ------  ------------ ---- ---- ---- ----- -------------- --------------
  data      0b.0    0b   -   -   SA:A  -   SAS  N/A  806320/1651362560 819200/1677721600

 Spare disks (empty)
```

This command shows that the virtual data disk you defined is part of aggregate 0, and that there are no spare disks.

What to do after the Data ONTAP Edge system is running

After you have installed and started the Data ONTAP Edge system, you can configure the Data ONTAP storage settings and perform administrative tasks.

To configure SnapVault and SnapMirror technologies on your storage system, see the "Data protection using SnapVault" and "Data protection using SnapMirror" chapters in the *Data ONTAP Data Protection Online Backup and Recovery Guide for 7-Mode*.

Data ONTAP documentation is available on the NetApp Support Site at *support.netapp.com*. See the documentation listed in the table below to perform specific tasks.

For information about...	Go to the NetApp Support Site for the...
New features, enhancements, and known issues for your version of Data ONTAP software	*Data ONTAP Release Notes for 7-Mode* for your version of Data ONTAP
Managing all aspects of your system, and information about using OnCommand System Manager	*Data ONTAP System Administration Guide for 7-Mode*
Managing the iSCSI protocols for SAN environments	*Data ONTAP SAN Administration Guide for 7-Mode*
Managing file access for NFS, CIFS, HTTP, FTP, and WebDAV protocols	*Data ONTAP File Access and Protocols Management Guide for 7-Mode*
Enabling data protection features of Data ONTAP (such as SnapVault and SnapMirror)	*Data ONTAP Data Protection Online Backup and Recovery Guide for 7-Mode*
Managing storage resources using aggregates, managing data using volumes, qtrees, and quotas, and increasing storage efficiency using deduplication	*Data ONTAP Storage Management Guide for 7-Mode*
Setting up and managing configurations of networked storage systems	*Data ONTAP Network Management Guide for 7-Mode*
Upgrading the version of Data ONTAP software	*Data ONTAP Upgrade and Revert/Downgrade Guide for 7-Mode*

Data ONTAP Edge administration tasks

You can perform administration operations using dvadmin after the Data ONTAP Edge system is installed. Typical operations include monitoring system and disk status. Other operations include creating configuration backups, adding more storage, starting the monitor, or stopping and starting the Data ONTAP Edge system.

Note that any Data ONTAP configuration or monitoring operations must be performed using the Data ONTAP interface, available through the system console and System Manager.

The sections that follow define some of the administration tasks. In some cases only the dvadmin commands are listed that enable you to perform administrative functions. See the *Data ONTAP-v Administration Tool Command Reference* for complete command details.

Viewing system information

The commands described in this section enable you to view a variety of Data ONTAP Edge configuration settings.

The initial Data ONTAP Edge configuration is defined based on the properties you specified during the installation using the `vm setup` command (or the `vm create` and `vm prop set` commands).

The table below lists the dvadmin commands you use to view system information.

Command	Description
host show	When dvadmin is connected to a vCenter Server, this command shows the available ESX hosts. When connected to a host, it shows details about the host server.
network show	Displays the networks that are available to the host server through the virtual switch.
status	Displays the current dvadmin version and host server connection status.
vm network show	Displays the Data ONTAP-v virtual machine network adapters and the networks to which they are attached.
vm prop show	Displays the value of properties you have set to define Data ONTAP startup parameters.
vm serial show	Displays the available Data ONTAP-v virtual machine serial ports.
vm show	Displays detailed information about the Data ONTAP Edge system configuration and operating state.
vm state show	Displays the current Data ONTAP Edge configuration state.

There are other dvadmin commands that show system information, but they are discussed in other sections of this chapter. For example, showing the console log is discussed in *Logging operations* on page 43.

The table below lists the Data ONTAP commands you use to view system information.

Command	Description
`aggr status -r`	Displays the data disks that Data ONTAP Edge is managing and details about the aggregate.
`disk show`	Displays the data disks that Data ONTAP Edge is managing.
`license show`	Displays the Data ONTAP feature licenses that are currently enabled on the system.
`sysconfig`	Displays the Data ONTAP Edge system serial number, number of CPUs and RAM being used, and the number and size of the data disks. Using the options `-av` or `-p` provides additional details about the host ESX server. **Note:** If the `sysconfig -p` command displays an error about not having the appropriate vSphere credentials, use the `vmservices vsphere credential modify` command to enter the credentials.
`version`	Displays the Data ONTAP release version.

Virtual machine operations

The tasks described in this section enable you to change the operating state of the Data ONTAP Edge system.

Some of the operations described in this section can be performed using standard VMware ESX controls, for example, powering on and off the virtual machine. While these operations typically will not damage the Data ONTAP Edge system or Data ONTAP, you should use dvadmin for operations that directly affect the Data ONTAP-v virtual machine.

For example, the initial startup of the Data ONTAP Edge system *must be* performed using the dvadmin `vm start` command because initial configuration parameters are passed to Data ONTAP by dvadmin at that time.

The table below lists the commands you use to change the operating state of the Data ONTAP Edge system.

Command	Description
`vm console connect`	Connects to the Data ONTAP Edge system console to administer your storage system using the Data ONTAP command line interface.

Command	Description
`vm console disconnect`	Disconnects another session from the Data ONTAP Edge system console.
`vm destroy`	Deletes the Data ONTAP Edge system from the host server.
`vm network connect`	Connects a Data ONTAP-v virtual machine network adapter to a network that is available on the host server through the virtual switch.
`vm prop set`	Defines or changes Data ONTAP-v properties that will be passed to Data ONTAP at initial startup.
`vm prop unset`	Clears Data ONTAP-v properties that will be passed to Data ONTAP at initial startup.
`vm restart`	Restarts the Data ONTAP Edge system.
`vm start`	Starts the Data ONTAP Edge system. This starts the virtual machine and the Data ONTAP storage system.
`vm stop`	Stops the Data ONTAP Edge system. This stops the virtual machine and the Data ONTAP storage system.

Storage operations

The storage operations you can perform include viewing physical disk information, managing storage pools, and managing virtual disks.

A brief description of these storage terms is provided below:

- A *physical disk* is the disk or disks available to the host server. The space from disks is presented to the host server as LUNs.
- A *storage pool* is a logical container within a LUN that holds virtual machine files. The space in the pools can be used by Data ONTAP Edge for system information or for data storage.
- A *virtual disk* is the defined space that Data ONTAP Edge sees as an actual disk. Multiple virtual disks can exist within a storage pool. These disks are formatted and managed by the virtualization hypervisor. The virtual disks are used by Data ONTAP Edge as either system disks or data disks:

  - *System disks* are used internally for the Data ONTAP and virtual machine installation, and for the virtual NVRAM and system files. Three system disks are created automatically when Data ONTAP Edge is installed.
  - *Data disks* are the disks that Data ONTAP Edge manages as application storage. Multiple data disks can be created within a storage pool.

The table below lists the commands you use to manage the storage pools and data disks that Data ONTAP Edge uses.

Command	Description
pdisk show	Displays the physical disks, or LUNs, that are available to the host server.
pool create	Creates storage pools on both local storage and on attached SCSI LUNs.
pool destroy	Destroys a storage pool from a disk.
pool show	Displays the storage pools that are available to the host server.
vm disk create	Creates a virtual data disk that Data ONTAP Edge will manage as application storage.
vm disk destroy	Destroys a data disk that was being managed by Data ONTAP Edge.
vm disk show	Displays the virtual disks that Data ONTAP Edge is using and managing.
vm headswap	Moves data disks from one Data ONTAP Edge system to another Data ONTAP Edge system.

Adding a new data disk to an existing system

You can add data disks to your storage system either by using available space from an existing storage pool, or by adding new physical disks. The new data disks can be made into active or a spare disks in a Data ONTAP aggregate.

Before you begin

The Data ONTAP Edge system must be powered off for a short time while the virtual disk is added to the system.

About this task

The Data ONTAP Edge storage system has four SCSI disk controllers: 0 through 3. Each controller can manage up to 15 virtual data disks - for a maximum of 60 disks. As you add data disks to the system, they are allocated in a round-robin fashion to each controller. If your storage system currently has two data disks, then one disk is managed by controller 0 and one disk is managed by controller 1. If you add two more disks to your system, then each disk is added to a new controller (controllers 2 and 3).

Data disks are created using the default checksum type. This is the checksum type used to create the initial data disks on the system. For new Data ONTAP Edge storage systems, the default is "zoned".

The process of adding a new virtual data disk to the system requires using both dvadmin and Data ONTAP commands. The first four steps apply only in the case where you have added a new physical disk to the system. You can start with step 5 if you are adding a new disk from storage space that is available on an existing pool.

Steps

1. Install a new disk into the system, create a RAID group, and then define a LUN or LUNs.

2. Add the LUN, or LUNs, to the host server and verify that the server can see the LUN.

3. Using dvadmin, enter the `pdisk show` command to display the canonical name of the new physical disk (LUN).

4. Create a storage pool from the new physical disk using the `pool create` command.

5. Power off the Data ONTAP Edge system using the `vm stop` command.

6. Create one or more new virtual disks in the storage pool using the `vm disk create` command.

7. Power on the Data ONTAP Edge system using the `vm start` command.

8. Connect to the Data ONTAP Edge system console using the `vm console connect` command in order to interface with Data ONTAP.

   When the **Password:** prompt appears, enter the Data ONTAP root password.

9. Use the `disk show` and `disk show -n` commands to see the currently owned and unowned disks.

   New disks that require a new Data ONTAP-v controller to be initialized will come up as "Not Owned".

10. Use the `disk assign` command to assign the new virtual disk to the storage system. If you added multiple virtual disks, use the `disk assign all` command.

    This makes the disk into a "spare" disk.

11. Enter the `aggr create <aggr_name> <num_disks>` command to create a new aggregate and add the specified number of spare disks to that aggregate. You can also add the new disks to an existing aggregate using the `aggr add` command.

    The disks need to be zeroed before they are added to the aggregate. That process starts automatically, and you will be notified by the system log as the disks are added.

After you finish

After the disks have been zeroed, you can create volumes and perform other operations to use the newly added capacity. See the *Data ONTAP Storage Management Guide for 7-Mode* for more information on creating and expanding aggregates.

Replacing a Data ONTAP Edge system while preserving data disks

In certain situations, you may need to replace an existing Data ONTAP Edge system, but keep the data disks that Data ONTAP was managing. In these cases, you can create a new Data ONTAP Edge

system, and then reassign the disks from the old virtual machine to the new virtual machine (this is known as a *head swap*).

Before you begin

Part of this task requires that you are running in maintenance mode on the storage system console. Note that the disks cannot be active when running this procedure.

About this task

One situation where you may want to perform this task is if there is a problem updating Data ONTAP software using the `software update` command. In this case, you can create a new Data ONTAP-v instance with an updated Data ONTAP image, and then reassign the data disks to the new Data ONTAP Edge system. You might also want to perform this task when installing the Data ONTAP-v virtual machine onto a a different storage pool.

Follow the steps below to redeploy a Data ONTAP Edge system and preserve the existing data disks:

Steps

1. Shut down the existing Data ONTAP Edge system by entering the `vm stop` command.

   The virtual machine should completely shut down in a minute or so. If it does not shut down in a reasonable amount of time, use the `--force` option of the `stop` command.

2. If all the space on the defined pools (datastores) is already reserved for data disks and the virtual NVRAM disk, you will need to manually move the existing NVRAM VMDK file before you can create the replacement Data ONTAP Edge system. See *Moving the NVRAM VMDK file* on page 41 for instructions.

3. Create the new Data ONTAP Edge system with a new name using the `vm create` command. Note that the options you specify when creating the replacement virtual machine are slightly different than what you used to create the original Data ONTAP Edge system. The full syntax for creating a replacement Data ONTAP-v virtual machine is as follows:

   `vm create vm_name --headswap pool_name nv_pool_name network_name`
   `license=license_string`

   This command creates the new Data ONTAP Edge system. Note that the `license string` can be the same as or different from the license used with original Data ONTAP-v.

4. Set any additional Data ONTAP-v properties for this virtual machine using the `vm prop set` command, if required.

5. Reassign the SCSI data disks from the old Data ONTAP Edge system to the new Data ONTAP Edge system using the `vm headswap` command.

6. Start the new Data ONTAP Edge system by entering the `vm start` command.

7. Connect to the system console on the new Data ONTAP Edge system in order to interface with Data ONTAP using the `vm console connect` command.

8. Press Ctrl-C during Data ONTAP startup to bring up the boot menu.

9. Boot into maintenance mode and enter the following command to reassign the disks to the new Data ONTAP system:

   disk reassign -s *old_sysid* -d *new_sysid*

   You can find the *old_sysid* and the *new_sysid* by running the disk show -a command.

10. Perform a halt (while giving advance warning to CIFS users), and then boot the Data ONTAP storage system normally.

   Data ONTAP should now power up normally and recognize the assigned data disks.

After you finish

After you have verified that the new Data ONTAP Edge system is operating as expected, you can destroy the old Data ONTAP Edge system by entering the vm destroy command from dvadmin.

Moving the virtual NVRAM VMDK file

To make space available for a new virtual NVRAM VMDK that will be created as part of a new Data ONTAP Edge system, you must move or delete the existing virtual NVRAM VMDK using the vSphere Client graphical user interface.

About this task

This task should be performed only as part of the process for replacing a Data ONTAP Edge system while preserving data disks.

Steps

1. Launch the VMware vSphere Client to access the host server on which the Data ONTAP Edge system is installed.

2. Navigate to **Inventory** > **Datastores**.

3. On the Summary tab, click **Browse Datastore...**.

4. In the Folder view of the Datastore Browser window, select the datastore (pool) where you created the NVRAM disk (when you issued the vm create command).

5. Right-click the NVRAM VMDK (for example, test_dotv_3.vmdk) and select **Move to...** to move the .vmdk file to the local datastore (pool) where you installed the Data ONTAP Edge system. The NVRAM VMDK file should be approximately 4.5 GB.

Data ONTAP-v administration tool monitor operations

The Data ONTAP-v administration tool monitor is used to enable functionality that support personnel can use to help diagnose and repair issues on the Data ONTAP Edge storage system. It is also used to perform automatic backups of the Data ONTAP Edge configuration.

The monitor provides the following functionality:

- logging of all Data ONTAP system console operations
- automatic offline backup of system disks and configuration information (not data disks)
- a "watchdog" that monitors the health of the virtual machine and restarts a failed system (optionally producing a core file that can be used to diagnose the system)

The table below lists the commands that are available for using the monitor tool.

Command	Description
`vm monitor start`	Starts the dvadmin monitor.
`vm monitor show`	Displays whether or not the dvadmin monitor is running.
`vm monitor stop`	Stops the dvadmin monitor.
`vm monitor log show`	Displays a log of the dvadmin monitor activity.
`vm monitor log clear`	Renames the existing monitor log and starts a new, empty monitor log.

Because the monitor enables other Data ONTAP Edge functionality, such as console logging and automatic backups, see *Backup and restore tasks* on page 42 and *Logging operations* on page 43 for tasks associated with those operations.

Backup and restore operations

Backup and restore operations are provided with dvadmin to protect Data ONTAP Edge system files and configuration information. Data ONTAP Edge system information is *not* backed up or restored during Data ONTAP backup or restore operations.

The backup image includes the virtual machine configuration (excluding data disks) and all of the information on the Data ONTAP Edge system disks, including:

- the Data ONTAP software image
- the cfcard file
- the swap and /var contents

When the dvadmin monitor is running, a backup of all Data ONTAP Edge configuration information is created automatically when any Data ONTAP Edge configuration change is made. For extra safety, you can perform manual backups to save specific snapshot copies of your configuration.

dvadmin restricts the number of backup files to three. Using the "name rotation" mechanism, as each new backup is made, the previous backup file is renamed. When a fourth backup file is made, the oldest backup file is automatically deleted.

For example, the automatic backup that the dvadmin monitor creates is called "monitor-backup". When the next automatic backup is created, the original file "monitor-backup" is renamed to "monitor-backup.1", and the new backup is named "monitor-backup". When the next automatic backup is created, "monitor-backup.1" is renamed to "monitor-backup.2", "monitor-backup" is renamed to "monitor-backup.1", and the new backup is named "monitor-backup". The next automatic backup will delete "monitor-backup.2" and then rename the other files as described above.

This "name rotation" mechanism also applies to backups made manually using the `vm config backup` command.

The backups are stored on the pool where the Data ONTAP-v virtual machine is installed. It is recommended that this pool have at least 2 GB of available space for holding up to a maximum of three complete automatic backups.

> **Note:** If the Data ONTAP image itself is updated (by using the Data ONTAP `software update` command), the first backup made after the update will occupy up to a maximum of 0.5 GB.

The table below lists the commands you use to manage Data ONTAP Edge system backups.

Command	Description
`vm config backup`	Creates a backup of Data ONTAP-v system information.
`vm config remove`	Deletes old Data ONTAP Edge backup images when they are no longer needed.
`vm config restore`	Restores a backed up Data ONTAP Edge configuration.
`vm config show`	Displays a list of the backup images that are available for the current Data ONTAP Edge storage system.

Logging operations

Logs are used to capture system and user actions in order to help resolve issues.

The logs discussed in this section are the following:

- Data ONTAP-v system console log - A log of all interactions with the storage system through the system console. This includes all entered Data ONTAP commands and their results.
- VMware virtual machine log - A log of all virtual machine operations. This is the `vmware.log` file that VMware creates.

- Data ONTAP-v core dump - A core file that technical support can use to help troubleshoot a specific hardware or software failure.

  Note: The dvadmin monitor collects the console log information, so the monitor must be running in order to have data in the console log.

There is also a monitor log that tracks all Data ONTAP-v administration tool activity. See *Data ONTAP-v administration tool monitor operations* on page 42 for information about this log file.

The table below lists the commands you use to view and save Data ONTAP-v system logs.

Command	Description
vm console log show	Shows the captured storage system console output from the connected Data ONTAP-v system.
vm console log clear	Saves the existing console log to a file and then starts a new, empty console log.
vm log show	Displays the VMware virtual machine log file from the connected Data ONTAP-v virtual machine.
vm log save	Saves the VMware virtual machine log to a file.
vm coredump	Forces Data ONTAP-v to dump a core file and resets the storage system.
vm savecore	Extracts the contents of a coredump from a Data ONTAP-v storage system and writes it to a core file.
ssh setup	Enables SSH connectivity to the ESX host to allow the collection of a core file.
ssh status	Displays whether there is SSH connectivity between Data ONTAP-v and the connected ESX host.

Data ONTAP Edge advanced installation instructions

Manually entering dvadmin commands instead of using the dvadmin setup wizard to create and start your Data ONTAP Edge storage system provides some installation flexibility.

The following table compares advanced and standard (wizard-driven) installations.

Feature	Advanced installation	dvadmin setup wizard
Ease of use	Depends on the experience and care of the technician performing the installation	Provides an interview-based, guided setup that is less error-prone than the manual data entry required by advanced installations
Monitor settings	The dvadmin monitor can be set to: • enable or disable automatic backups • enable or disable console logging • enable or disable the watchdog	The dvadmin monitor is set to: • enable automatic backups • enable Data ONTAP system console logging • disable the watchdog
Scripting support	Provides the ability to execute multiple dvadmin commands to script installation or other operations. This functionality is provided by using the `source` command.	Not applicable

If you do not need the flexibility provided by entering the individual commands, follow the steps in *Installing Data ONTAP Edge using the dvadmin setup wizard* on page 24.

Follow the steps in this section to create and start your Data ONTAP Edge storage system by manually entering the required commands. See the *Data ONTAP-v Administration Tool Command Reference* for complete command details.

The topics described in this section are:

- Installing Data ONTAP Edge
- Configuring additional Data ONTAP Edge properties
- Creating virtual data disks
- (optional) Creating additional network connections
- (optional) Starting the dvadmin monitor
- Starting Data ONTAP Edge for the first time
- Connecting to the Data ONTAP storage system console

Installing Data ONTAP Edge

You install Data ONTAP Edge on a server using dvadmin. The Data ONTAP Edge software package is contained within the Data ONTAP-v Installer virtual machine.

Before you begin

dvadmin must be connected to a host before issuing the command described in this task. If you connected dvadmin to a vCenter Server, you must issue the `host <hostname>` command before installing Data ONTAP Edge. Additionally, the two storage pools (datastores) that you plan to use must already exist.

About this task

Installing Data ONTAP Edge requires that you specify many variables including the Data ONTAP-v virtual machine name, the storage pool name, the Data ONTAP Edge license, and more. These are the items you recorded earlier in the configuration worksheet.

Make sure that the name of the ESX host you are running on is known to the virtual machine either through the DNS service or through an entry in the virtual machine's */etc/hosts* file.

Step

1. Enter the following command to install Data ONTAP Edge:

   ```
   vm create <vm_name> <pool_name> <nv_pool_name> <network_name>
   <propertyN=valueN>
   ```

   There are two types of variables that you must enter in this command:

   - Data ONTAP-v configuration variables that define Data ONTAP Edge
   - Data ONTAP variables that Data ONTAP-v passes through to set Data ONTAP properties.

   The required Data ONTAP-v variables are described in the table below. These variables must be entered in the listed order, and they should be enclosed in quotation marks when the involved value contains spaces:

Variable name	Type	Description
`vm_name`	string	The name you have defined for the Data ONTAP Edge system. This name should use ASCII characters only.
`pool_name`	string	The name of the storage pool backing the Data ONTAP-v virtual machine. This pool must already exist. Use the `pool show` command to view the available pools.

Variable name	Type	Description
`nv_pool_name`	string	The name of the storage pool backing the virtual NVRAM. This can be the same as `pool_name`, but it is highly recommended that it is a separate pool that is backed by a storage device with a battery-backed write cache.
`network_name`	string	The name of the network to which the adapter should be connected. This is typically your management network. Use the `network show` command to view the available networks.

The required Data ONTAP properties are described in the table below. These properties must be entered in the format `property=value`, each property should be separated by a space, and `value` should be enclosed in quotation marks if it contains spaces:

Property name	Type	Description
`license`	string	The unique 24-character Data ONTAP Edge platform license.
`hostname`	string	The host name by which the storage system is known on the network (corresponds to the primary IP address).
`ipaddr`	ip	The primary Data ONTAP-v interface (e0a) IP address.
`netmask`	ip	The primary Data ONTAP-v interface (e0a) netmask.
`gateway`	ip	The gateway that is used for network connectivity.
`password`	string	The administrative password for the Data ONTAP root account. The password must be at least eight characters long, and it must contain at least one number and at least two alphabetic characters.
`vsphere_username`	string	The username for read-only access to the virtual machine host (the ESX server).
`vsphere_password`	string	The password for read-only access to the virtual machine host (the ESX server).

The `vm create` command verifies the values you enter to make sure they are valid. For example, it checks that the pool names exist, that the license has the correct number of characters and hyphens, and that the gateway exists. If this command encounters an error during creation of the Data ONTAP Edge system, it stops the installation and undoes any changes before returning control to the command line.

Example creating a Data ONTAP Edge system

The following command creates a Data ONTAP Edge system that will be named "dotv1", and installs it into the storage area defined by "system_pool". The space for the virtual NVRAM will be from "nvram_data_pool":

```
> vm create dotv1 system_pool nvram_data_pool network_1
  license=XXXX-YYYY-XXXX-YYYY-ZZZZ hostname=storage_1
  ipaddr=10.10.10.10 netmask=255.255.255.0 gateway=10.10.10.1
  password=xxxyyy111 vsphere_username=esxuser
vsphere_password=pswd123

Extracting and validating OVF package contents.
Creating VM dotv1 on host name.company.com.
Uploading disks to VM dotv1
Marked VM disks independent-persistent
Created VM dotv1 on host host name.company.com.
```

After you finish

Do not start the Data ONTAP Edge system at this point. You still need to create the virtual data disks that Data ONTAP will manage (in the "nvram_data_pool" storage pool), and possibly set some optional parameters as described in the next few pages.

> **Note:** You can also define some additional Data ONTAP properties before starting Data ONTAP Edge. This includes the time zone, DNS values, NIS values, and more. These properties are also set using the vm prop set command, and they must be defined before starting Data ONTAP Edge for the first time.

For more information about the values that are passed to Data ONTAP, see the "Configuration worksheet" section and the "Time zones" appendix in the *Data ONTAP Software Setup Guide for 7-Mode*.

You can run the vm show and vm prop show commands to verify that all the Data ONTAP-v property settings are correct. If you notice that a property value is incorrect, you can change it using the vm prop set command. The prop set command can be used *only before* you have started the Data ONTAP Edge system. After you have started the virtual machine and it has reached the "ready" state, you can change the property only by using the Data ONTAP setup command.

For example, the following vm prop show command shows the current system property settings.

```
> vm prop show dotv1

checksum_type = zoned
gateway = 10.10.10.1
hostname = storage_1
ipaddr = 10.10.10.10
license = XXXX-YYYY-XXXX-YYYY-ZZZZ
netmask = 255.255.255.0
```

```
password = *********
raidtype = RAID0
tmz = GMT
vsphere_hostname = dsmnn0.company.com
vsphere_password = *********
vsphere_username = esxuser
```

Configuring additional Data ONTAP Edge property settings

You can define additional Data ONTAP properties that will be passed to Data ONTAP at initial startup. You can also change some of the Data ONTAP Edge and Data ONTAP properties that you defined when you initially issued the `vm create` command.

Before you begin

These properties must be set (or changed) before you power on (start) the Data ONTAP Edge system for the first time. After Data ONTAP Edge has been started and has reached the "ready" state (see the `vm state show` command), these commands can no longer be used. Any changes to Data ONTAP properties must be made directly using the Data ONTAP interface.

About this task

There are two commands you can use to change Data ONTAP Edge property values:

- `vm prop set` sets or changes the property.
- `vm prop unset` unsets, or clears, the property.

Steps

1. Enter the following command to set or change one or more Data ONTAP Edge properties:

   vm prop set <vm_name> <propertyN=valueN ...>

2. Enter the following command to unset one or more Data ONTAP Edge properties:

   vm prop unset <vm_name> <propertyN ...>

   There are two types of properties that can be entered in *propertyN* for these commands:

   - Required properties that you defined in the `vm create` command.
   - Optional properties that customize Data ONTAP settings. These properties cannot be defined using the `vm create` command. If you want to configure an optional property, it must be set before the initial Data ONTAP Edge startup.

   Note that you must place quotes around properties that contain spaces.

   The required properties are listed in the table below.

Required property name	Type	Description
license	string	The unique 24-character Data ONTAP-v platform license.
hostname	string	The host name by which the storage system is known on the network.
ipaddr	ip	The primary Data ONTAP-v interface (e0a) IP address.
netmask	ip	The primary Data ONTAP-v interface (e0a) netmask.
gateway	ip	The gateway that is used for network connectivity.
password	string	The administrative password for the Data ONTAP root account.
vsphere_username	string	The username for read-only access to the virtual machine host (the ESX server).
vsphere_password	string	The password for read-only access to the virtual machine host (the ESX server).

The optional properties are listed in the table below.

Optional property name	Type	Description
checksum_type	string	The checksum type that will be used when creating data disks using `vm disk create`: • "zoned" is the default setting, and it stands for Advanced Zone Checksum Scheme. • "block" stands for Block Checksum Scheme. See the *Data ONTAP Storage Management Guide for 7-Mode* for more information about checksums.
dns_domainname	string	The name of the Domain Name System (DNS) domain.
dns_ipaddr	ip	The IP addresses of the DNS servers you want to use, separated by commas. You can identify a maximum of three servers.

Optional property name	Type	Description
feature_licenses	string	A comma-delimited list of the Data ONTAP feature licenses you want to use, in addition to the default licenses that are installed automatically. The default licenses are: CIFS, NFS, iSCSI, FlexClone, SnapRestore, and SnapVault. **Note:** When installing a Data ONTAP Edge-T system you must add the SnapMirror license manually using this property.
iface1_ipaddr	ip	The IP address of the first interface (e0a).
iface1_netmask	ip	The netmask of the first interface (e0a).
iface2_ipaddr	ip	The IP address of the second interface (e0b).
iface2_netmask	ip	The netmask of the second interface (e0b).
iface3_ipaddr	ip	The IP address of the third interface (e0c).
iface3_netmask	ip	The netmask of the third interface (e0c).
iface4_ipaddr	ip	The IP address of the fourth interface (e0d).
iface4_netmask	ip	The netmask of the fourth interface (e0d).
iface5_ipaddr	ip	The IP address of the fifth interface (e0e).
iface5_netmask		The netmask of the fifth interface (e0e).
iface6_ipaddr	ip	The IP address of the sixth interface (e0f).
iface6_netmask	ip	The netmask of the sixth interface (e0f).
nis_domainname	string	The name of your Network Information Service (NIS) domain. The storage system can use an NIS domain to authenticate users and client computers.
nis_ipaddr	ip	The IP addresses of your preferred NIS servers, separated by commas. You can identify a maximum of three addresses. Additionally, you can enter the wildcard "*" to perform a broadcast across the default subnet to use any available NIS servers.
nodemgmt_interface	number	The interface that will be used to manage the VM. By default interface 1 (e0a) is used, but you can select a number from 2 through 6 if you want to manage the VM through a different interface.

Optional property name	Type	Description
tmz	string	The time zone in which the storage system resides. GMT is the default setting if you do not enter a value. See the "Time zones" appendix in the *Data ONTAP Software Setup Guide for 7-Mode* for valid values.

Note: The DNS, NIS, and interface properties must be set in pairs. This means that if you set a DNS domain name, you must set at least one DNS server IP address.

Note: When you enter an NIS domain name (*nis_domainname*), dvadmin automatically adds the wildcard character "*" as the NIS IP address (*nis_ipaddr*). You may enter individual IP addresses to override this value if you prefer.

Examples of changing Data ONTAP Edge properties

The following command changes the license value because you noticed that it was incorrect when entered in the `vm create` command:

```
> vm prop set dotv1 license=XXXX-YYYY-ZZZZ-AAAA-BBBB

Set license = XXXX-YYYY-ZZZZ-AAAA-BBBB (XXXX-YYYY-ZZZZ-AAAA-CCCC)
```

Note that the value in parentheses (`XXXX-YYYY-ZZZZ-AAAA-CCCC`) is the old value that is being replaced.

The following command unsets the DNS domain name and the DNS IP address settings:

```
> vm prop unset dotv1 dns_domainname dns_ipaddr

Unset dns_domainname (mydomain.mycompany.com)
Unset dns_ipaddr (123.123.123.123,123.123.123.124)
```

The following command shows the system response if you attempt to specify the DNS domain after Data ONTAP Edge has been started and has reached the "ready" state:

```
> vm prop set dotv1 dns_domainname=mydomain.mycompany.com

[15] CmdFailed: Cannot set/change property, VM 'dotv1' is in
'ready' state
```

After you finish

You can start the Data ONTAP Edge system once you have set the properties to the values you require, and after you have created data disks.

Creating virtual data disks

You must define one or more virtual data disks that Data ONTAP Edge will be responsible for managing. The data disks are created within the storage pools you defined with the `pool create` command.

Before you begin

The Data ONTAP Edge system must not be powered on when executing this command.

About this task

A virtual disk can consume the entire space from the specified storage pool, or multiple virtual disks can be created in a single storage pool. Note that a virtual disk can be no larger than 2 TB, so if your pool contains more than 2 TB, you will need to create multiple disks. Keep track of the size of each data disk you create on a pool to make sure you use the maximum amount of storage.

Data disks are created using the default checksum type. When creating a new Data ONTAP Edge system, the "zoned" checksum type is selected by default. You can change this setting to the "block" checksum type using the `vm prop set checksum_type` command if required. Zoned disks provide more usable storage space, so this default setting is recommended.

Note: If you do not create data disks that consume all the space in the storage pool before starting the Data ONTAP Edge system the first time, you will need to follow a separate procedure to add the data disks later. See *Adding a new disk to the system* on page 38 for details about adding data disks to an existing system.

Step

1. Define a virtual disk using the following command:
   vm disk create <vm_name> <pool_name> [size <k|m|g|t>]

   - *<vm_name>* is the name of the Data ONTAP Edge system.
   - *<pool_name>* is the name of storage pool that will host the virtual disk.
   - [*size <k|m|g|t>*] is a whole number followed by a byte unit character. If the size is not specified, a virtual disk that spans all the space available on the storage pool, or physical disk, will be created. The minimum disk size is 1 GB, and the maximum disk size is 2 TB. The byte unit character is one of the following values:

     - *k* - kilobyte
     - *m* - megabyte
     - *g* - gigabyte
     - *t* - terabyte

   Each virtual disk you add is given the name of the next virtual hard disk, for example, "Hard disk 4", "Hard disk 5", and so on. See the `vm disk show` command for more information.

> **Example of creating a virtual disk**
>
> The following command creates a 600 GB virtual data disk from the storage pool named
> "nvram_data_pool".
>
> ```
> > vm disk create dotv1 nvram_data_pool 600g
>
> Adding disk [1:0] backed by [nvram_data_pool] dotv1/dotv1_3.vmdk
> ```

After you finish

You can enter the vm disk show or vm show command to verify that the correct size disk was
added. For example, the following vm disk show command shows the three system disks and two
600 GB data disks.

```
> vm disk show dotv1

Disk Name      Ctrl:Unit  Size (MB)   UUID           Backing
Hard disk 1    ide0:0        1057     -              system_pool
Hard disk 2    ide0:1        1542     -              system_pool
Hard disk 3    ide1:0        5152     -              nvram_data_pool
Hard disk 4    scsi0:0     610400     <uuid-string>  nvram_data_pool
Hard disk 5    scsi1:0     610400     <uuid-string>  nvram_data_pool
```

Connecting the Data ONTAP Edge system to additional networks

There are six network adapters on the Data ONTAP-v virtual machine in the Data ONTAP Edge
system. By default, all of these adapters are connected to the network you specified in the vm
create command. Optionally, you can connect one or more network adapters to different networks
that are available on the host server.

Before you begin

The Data ONTAP Edge system must be powered off to run this command. Use the network show
and vm network show commands to get the name of the adapter and the name of the network to
which you want to connect.

About this task

Connecting additional networks is useful if you want to serve data over multiple networks, or
manage your Data ONTAP system from multiple networks.

Step

1. Specify the network to which you want to connect the adapter using the following command:

   `vm network connect <vm_name> <adapter_name> <network_name>`

   - *`<vm_name>`* is the name of the Data ONTAP-v virtual machine.
   - *`<adapter_name>`* is the name of the Data ONTAP-v network adapter.
   - *`<network_name>`* is the name of the network.

   The specified adapter is connected to the specified network.

   Example of connecting a virtual machine adapter to another network

   The following command connects Network adapter 2 to network "Network5".

   ```
   > vm network connect dotv1 "Network adapter 2" Network5

   Network adapter 2 connected to Network5
   ```

After you finish

You can enter the `vm network show` or `vm show` command to verify that the adapter was connected to the network.

Starting the Data ONTAP-v administration tool monitor

The dvadmin virtual machine monitor is an optional background process for monitoring the Data ONTAP-v virtual machine. It also provides for automatic system configuration backups and logging functionality.

About this task

It is recommended that you start the monitor before you start the Data ONTAP Edge system so that a log is recorded from initial startup. The log can help support personnel diagnose and repair issues on the Data ONTAP-v storage system.

The dvadmin monitor provides the following functionality:

- logging of Data ONTAP system console output
- automatic offline backup of Data ONTAP-v system disks and configuration information (*not* data disks)
- a "watchdog" that monitors the health of the Data ONTAP-v virtual machine and restarts a failed system (optionally producing a core file that can be used to diagnose the system)

  Note: The monitor will stop running if the virtual machine on which dvadmin is installed fails. The monitor will be restarted automatically once the virtual machine is restarted.

Step

1. Start the dvadmin monitor by entering the following command:

   `vm monitor start [--no-backup] [--no-console-log] [--no-watchdog] [--watchdog-no-coredump] <vm_name>`

   - *[--no-backup]*, if used, does not make automatic Data ONTAP-v configuration backups.
   - *[--no-console-log]*, if used, does not log console output from the Data ONTAP-v system.
   - *[--no-watchdog]*, if used, does not run the watchdog.
   - *[--watchdog-no-coredump]*, if used, starts the watchdog, but disables the creation of coredump files.

   The monitor is launched in the background and you are returned to the command prompt.

Examples of starting the monitor

The following command starts the monitor with all features enabled:

```
> vm monitor start dotv1

 vm monitor for dotv1 is running with no options
```

The following command starts the monitor, but does not enable watchdog functionality:

```
> vm monitor start --no-watchdog dotv1

 vm monitor for dotv1 is running with options --no-watchdog
```

After you finish

You can enter the vm monitor show command to view the current state of the monitor.

Verifying system settings before startup

It is very important that all the Data ONTAP-v and Data ONTAP settings are correctly set before you start the Data ONTAP Edge system for the first time.

There are two commands you can use to verify Data ONTAP Edge property settings:

- The vm show command displays the current Data ONTAP Edge system name, the hard disk where the Data ONTAP Edge system files reside, etc...

- The `vm prop show` command displays all the Data ONTAP properties that will be passed through to Data ONTAP during its initial startup.

The following example displays the value of any Data ONTAP property you set with the `vm create` and `vm prop set` commands.

```
> vm prop show dotv1

checksum_type = zoned
dns_domainname = dns_server12
dns_ipaddr = 123.123.123.123,123.123.123.124
gateway = 10.97.128.1
hostname = system2
ipaddr = 10.97.131.27
license = XXXX-YYYY-ZZZZ-AAAA-BBBB
netmask = 255.255.248.0
password = *********
raidtype = RAID0
tmz = America/New_York
vsphere_hostname = dsmnn0.company.com
vsphere_password = *********
vsphere_username = root
```

Make sure these settings are correct before you continue. Use the `vm prop set` command if you need to change any values.

Starting Data ONTAP Edge for the first time

You must start the Data ONTAP-v virtual machine for Data ONTAP Edge to be operational. The first time you power on the Data ONTAP Edge system it passes configuration properties to Data ONTAP so that Data ONTAP can configure itself correctly.

Before you begin

Do not start the Data ONTAP Edge system using VMware commands or the VMware vSphere Client. The Data ONTAP Edge system must be started the first time using the dvadmin `vm start` command. Failing to do so will result in Data ONTAP being misconfigured.

About this task

During the initial power-on sequence, the Data ONTAP Edge system initiates an auto-setup process that performs the following operations:

- validates the license and system resources (2 physical CPU cores and 4 GB of RAM)
- accesses and verifies the properties passed from the `vm create` and `vm prop set` commands
- initializes the data disks
- creates serial ports
- configures the hostname, network, and administrator account

It will reboot once during the setup process. Note that complete startup can take five or more minutes.

> **Note:** If the property verification or configuration of Data ONTAP fails, the startup process will stop and log a message to the console and to the VMware logs. Use the `vm state show` command to display the reason for the failure. Once you fix the condition that caused the error (in some cases by changing a property value using the `vm prop set` command), restart the Data ONTAP Edge system so that it can go through the auto-setup process again.

Step

1. Enter the following command to start the Data ONTAP Edge system.

```
vm start <vm_name>
```

Result

In addition to configuring Data ONTAP with the settings you specified and starting Data ONTAP, the auto-setup process also creates a single aggregate using all the data disks you defined with the `vm disk create` command. It also creates a single volume within that aggregate.

Example of starting Data ONTAP Edge

The following command starts virtual machine "dotv1":

```
> vm start dotv1

start VM dotv1
```

After you finish

Once the Data ONTAP Edge system is running, you can connect to the Data ONTAP system console (or System Manager) to further configure your storage settings. See the Data ONTAP Software documentation for more information.

Verifying system settings after startup

You should verify that the virtual machine and Data ONTAP have started successfully before continuing to configure your storage system.

Use the `vm show` command to display the Data ONTAP Edge configuration information.

The following example displays detailed information for the Data ONTAP Edge system "dotv1" after Data ONTAP has finished starting.

```
> vm show dotv1
```

```
VM Name      Power  CfgState  Heartbeat  Hostname    IP Address
dotv1        on     ready     green      system2     10.10.10.1

VM Version  Data ONTAP Version   Serial Number  System ID
1.x         8.x.x                2006000000015  2147483903

Disk Name      Ctrl:Unit  Size (MB)  UUID           Backing
Hard disk 1    ide0:0     1057       -              system_pool
Hard disk 2    ide0:1     1542       -              system_pool
Hard disk 3    ide1:0     5121       -              nvram_data_pool
Hard disk 4    scsi0:0    610400     <uuid-string>  nvram_data_pool
Hard disk 5    scsi1:0    610400     <uuid-string>  nvram_data_pool

Adapter Name          MAC Address            Network Name
Network adapter 1     00:50:56:9c:28:2d      VM Network
Network adapter 2     00:50:56:9c:7e:77      VM Network
Network adapter 3     00:50:56:9c:3b:a2      VM Network
Network adapter 4     00:50:56:9c:34:f5      VM Network
Network adapter 5     00:50:56:9c:3b:23      VM Network
Network adapter 6     00:50:56:9c:34:5e      VM Network

Serial Name     Port  Conn  Status        Details
Serial port 1   0     Y     ok            Remote tcp://:7200
Serial port 2   1     Y     ok            Pipe dotv1_serial_1

Resource              Reservation
CPU                   5332 MHz
Memory                4096 MB
```

The important entries to verify include:

- Cfgstate - When Data ONTAP has successfully completed startup, this value will be "ready". If the value is "new" or "init", you may need to wait a few more minutes for startup to complete. If the value is "failed", use the `vm state show` command to view the reason for the failure.
- Power - This value should be "on". If it is "off", run the `vm start` command to start the Data ONTAP Edge system.
- Heartbeat - This value should be "green" when Data ONTAP has completed startup. It may go through "gray", "yellow", and "red" stages during the boot and initialization process.
- Hostname and IP Address - These fields are empty during the boot process. They are populated with real values when Data ONTAP is powered on and fully set up.
- VM Version - The version of the Data ONTAP-v OVF package used when installing the Data ONTAP Edge system.
- Data ONTAP Version - The version of Data ONTAP software that is installed.
- Serial Number and System ID - These values are the serial number and system ID of the storage system.
- Serial ports - The "Conn" and "Status" fields will be "Y" and "ok", respectively, when Data ONTAP has completed startup.

You can re-enter the `vm show` command to refresh this information. After Data ONTAP Edge has completed startup, you can access the system console to configure the storage system.

Note: You do not have to wait for the system to have finished startup before accessing the system console. It may be useful to verify that the system has started successfully before you continue.

Connecting to the Data ONTAP Edge storage system console

You connect to the Data ONTAP Edge console in order to interface with Data ONTAP to administer your storage system. The console enables you to use the Data ONTAP command line interface.

About this task

You can connect to your Data ONTAP Edge storage system using a dvadmin command. You can also connect to the storage system using other methods:

*   An SSH client, such as PuTTY, can be used to connect directly to the primary IP address (e0a) of the storage system, for example ssh -l root 10.10.10.10.
*   NetApp OnCommand System Manager can be used to administer the storage system using the primary IP address. See the NetApp Support Site at *support.netapp.com* to access System Manager software.

You can have only one dvadmin console connection to a storage system at a time. However, you can have a dvadmin console connection and an SSH or System Manager connection concurrently.

Note that this command could fail with Error: [85] VmSerialConnectErr depending on the ESX firewall setting. The ESX firewall either needs to be disabled, or the firewall rule for "remoteSerialPort" needs to be enabled. For example, in vSphere 5, select the host through the vSphere Client and select **Configuration > Security Profile > Firewall Properties** and make sure the check box is selected for **VM Serial port connected over network**.

Steps

1. Enter the following command to connect to the storage system console for a specific Data ONTAP Edge system:

    vm console connect <vm_name>

2. Enter the Data ONTAP root password, and then you can configure Data ONTAP settings.

Example console access

The following example shows how to access the storage system console for the Data ONTAP Edge system named "dotv1":

```
> vm console connect dotv1

Connecting to console on dotv1. Use ^]-x to exit or ^]-h for help.
[connecting]
[connected]
Password: ********
storage1>
```

To exit the console and return to the dvadmin prompt, use the escape key sequence Ctrl-]x
(press the "Ctrl' and "right bracket" keys together, then press the "X" key).

After you finish

To confirm that Data ONTAP has started successfully, you can run the Data ONTAP aggr status
-r command, as shown below:

```
storage1> aggr status -r
Aggregate aggr0 (online, raid0) (advanced_zoned checksums)
 Plex /aggr0/plex0 (online, normal, active)
  RAID group /aggr0/plex0/rg0 (normal, advanced_zoned checksums)

  RAID Disk Device  HA  SHELF BAY CHAN Pool Type  RPM  Used (MB/blks)     Phys (MB/blks)
  --------- ------  ------------- ---- ---- ---- ----- --------------     --------------
  data      0b.0    0b    -    -   SA:A   -   SAS  N/A  806320/1651362560 819200/1677721600

 Spare disks (empty)
```

This command shows that the virtual data disk you defined is part of aggregate 0, and that there are
no spare disks.

Data ONTAP-v supported and unsupported functionality

The Data ONTAP-v storage software running on a virtual machine (for example, the Data ONTAP Edge product) does not support all the functionality of Data ONTAP when it is running on a hardware controller.

Data ONTAP-v supported functionality

A Data ONTAP-v storage system supports a subset of Data ONTAP functionality when running on a virtual machine with virtual disks.

The following tables list the supported and unsupported Data ONTAP functionality when using Data ONTAP-v storage software.

Note: Where "Supported" is marked as "Yes", it is supported for both Data ONTAP Edge and Data ONTAP Edge-T, unless otherwise indicated.

Protocol support

Protocol	Supported?
iSCSI	Yes
NFS	Yes
CIFS	Yes
FCP	No

Data ONTAP features

Feature	Supported?
Deduplication	Yes
FlexClone	Yes
FlexVol	Yes
FlexCache	Yes
SnapRestore	Yes
SnapShot	Yes

Feature	Supported?
SnapVault (Primary)	Yes
SnapVault (Secondary)	No - Data ONTAP Edge Yes - Data ONTAP Edge-T
SnapMirror	No - Data ONTAP Edge Yes - Data ONTAP Edge-T
Compression	No
MultiStore / vFiler	No
SyncMirror	No
FlexShare	No
SnapLock and SnapLock Enterprise	No
SnapProtect	No
High Availability	No
Software RAID	No
Disk Sanitization	No
MetroCluster	No
VTL	No
Disk Maintenance Center	No
Tape device	No

Client software support

Feature	Supported?
SnapManager for Microsoft Exchange	Yes
SnapManager for Hyper-V	Yes
SnapManager for SharePoint	Yes
SnapManager for Microsoft SQL Server	Yes
SnapManager for Oracle	Yes
SnapManager for SAP	Yes

Feature	Supported?
Virtual Storage Console (VSC)	Yes
Single Mailbox Recovery	Yes
SnapDrive for Windows	Yes
SnapDrive for UNIX	Yes

OnCommand Management software support

Feature	Supported?
System Manager	Yes
Unified Manager • Operations Manager • Protection Manager • Provisioning Manager	OnCommand Unified Manager supports operational monitoring of Data ONTAP-v storage systems.
OnCommand Insight family	No
OnCommand Balance	No
Virtual File Manager	No

Unsupported licenses

Data ONTAP feature license keys are available only for those features that are supported on the Data ONTAP-v storage system.

The following licenses are not available when running Data ONTAP on the Data ONTAP-v platform:

- FCP: Fiber channel controllers
- Insight_Balance: The OnCommand Balance and OnCommand Insight products
- SnapLock, SnapLock_Enterprise: SnapLock compliance and enterprise
- SnapProtectApps: SnapProtect
- V_StorageAttach: There is no way to access third-party array LUNs (V-Series systems) within a virtual machine.

Unsupported commands

Some Data ONTAP commands are not supported on the Data ONTAP-v storage platform.

These commands are unavailable for a variety of reasons:

- lack of license support
- lack of hardware support
- lack of support for physical disks (Data ONTAP-v uses virtual disks)

Commands disabled due to lack of license support

The following commands are disabled due to lack of license support:

- `fcp`: Fails with "fcp: FCP is not licensed."
- `fcadmin`: Fails with "Error: fcadmin is not supported on this platform."
- `fcstat`: Requires an adapter. Fails with "Error: fcstat is not supported on this platform."
- `snaplock`: Volumes cannot be configured for SnapLock, so the commands fail when given a non-SnapLock volume.

Commands disabled due to lack of hardware support

The following commands are disabled because required hardware is not available on a Data ONTAP-v storage system:

- `cf`: Fails with "Controller is in Non-HA mode."
- `partner`: Fails with "partner: command not supported -- non-HA mode."
- `bmc`: The Baseboard Management Controller is not present on a Data ONTAP-v system. This command fails with "There is no BMC (Baseboard Management Controller) in this system."
- `rlm`: There is no physical Remote LAN Module present on a Data ONTAP-v system. This family of commands fails with "There is no RLM (Remote LAN Module) in this system."
- `sp`: There is no SP (Service Processor) present on a Data ONTAP-v system. This family of commands fails with "There is no SP (Service Processor) in this system."
- `environment`: There are no hardware sensors on a Data ONTAP-v storage system. This command fails with "The 'environment' command is not supported on this platform."
- `portset`: There are no fiber channel ports on a Data ONTAP-v storage system. This command fails with "portset: WARNING: portset commands are not allowed on filers with no fcp ports."
- `shelfchk`: There are no shelves supported a Data ONTAP-v storage system. This command fails with "No disk enclosure services active on this system."
- `mt` and `tape.reservations`: These commands and options are not supported because tape devices are not supported on a Data ONTAP-v storage system.

Commands disabled due to using virtual disks

The following commands and options perform operations on a disk level and are not supported because the Data ONTAP-v storage system uses virtual disks:

- `disk_fw_update`: Performs a disk firmware update
- `disk maint start`: This command, and the disk.maint_center.* options, control the Disk Maintenance Center, which is not supported
- `disk simpull` and `disk simpush`: Simulates a disk uninstall or install
- `vol media_scrub`: Performs a VERIFY scrub of disks used for trad volumes
- `aggr media_scrub`: Performs a VERIFY scrub of disks used for flex volumes
- `raid.media_scrub.*`: Options for performing VERIFY scrubs of disks
- `raid.background_disk_fw_update.enable`: Performs automatic disk firmware updates
- All `sasadmin` subcommands, except: dev_stats, adapter_reset, adapter_zombie, adapter_offline, adapter_online, adapter_state, and channel
- `sasstat` subcommands that are specific for disk shelves and expanders: shelf, expander_map, and expander_phy_state

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