PowerProtect DD Virtual Edition on Google Cloud Platform

Installation and Administration Guide

DDVE 4.0

October 2020
Rev. 07

Notes, cautions, and warnings

NOTE: A NOTE indicates important information that helps you make better use of your product.

CAUTION: A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

WARNING: A WARNING indicates a potential for property damage, personal injury, or death.

Contents

Revision history

Table 1. DDVE 4.0 in Google Cloud Platform Installation and Administration Guide revision history

Revision	Date	Description
07	October 2020	Documentation bug fixes
06	March 2020	Editorial updates
05	January 2020	Editorial updates
04	September 2019	Editorial updates
03	March 2019	Editorial updates
02	February 2019	DD OS 6.2.0.10 Release
01	December 2018	Initial Publication (with DD OS 6.2.0.5).

Preface

As part of an effort to improve its product lines, we periodically release revisions of its software and hardware. Therefore, some functions described in this document might not be supported by all versions of the software or hardware currently in use. The product release notes provide the most up-to-date information on product features.

Purpose

This manual describes how to install, configure, and administer DD Virtual Edition (DDVE) systems.

Audience

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

Related documentation

The following publications and websites provide additional information:

- *DD Operating System Release Notes*
- *DD Operating System Initial Configuration Guide*

  This manual explains configuration steps that are common to hardware and virtual DD systems.
- *DD Operating System OS Command Reference Guide*

  This manual explains how to administer DD systems from the command line.
- *DD Operating System OS Administration Guide*

  This manual explains how to administer DD systems with the System Manager graphical user interface.
- *DD Boost for OpenStorage Administration Guide*

  This manual explains how to use the DD Boost protocol for data transfer between backup software and DD systems.
- *Avamar, DD and NetWorker Compatibility Guide*: http://compatibilityguide.emc.com:8080/CompGuideApp/

  This website lists Avamar and NetWorker software support for DDVE.

Where to get help

We support, product, and licensing information can be obtained as follows:

Product information	For documentation, release notes, software updates, or information about products, go to Online Support at https://support.emc.com.
Technical support	For technical support of this release of DDVE, go to Online Support at https://support.emc.com.

Your comments

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

1

Introducing DDVE

This chapter includes the following topics:

Topics:

Introducing DDVE

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

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

DDVE includes the following features:

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

DDVE runs on two types of platforms:

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

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

DDVE cloud features

Table 2. DDVE on GCP resource configuration size

Type	Resource configuration size
DDVE on Block storage	up to 16 TB
DDVE on Object storage **NOTE:** Object storage is recommended for new deployments.	up to 96 TB

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

Supported DD protocols

- DD Boost over IP
- DD Boost FS

Supported DD features

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

NOTE: DDVE supports these replication capabilities:

- Managed file replication and MTree replication
- Replication across availability zones and regions
- Replication within the GCP cloud and replication to and from other clouds

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

2

Deploying DDVE

This chapter includes the following topics:

Topics:

Deploying DDVE on the Google Cloud Platform

The following sections provide prerequisites and general guidelines to deploy, configure, and run DDVE on Google Cloud Platform (GCP) with Active Tier on Google Cloud Object Storage.

Prerequisites to Deploy DDVE in GCP

Complete the prerequisites in the following sections before attempting to deploy DDVE on the GCP.

The high-level prerequisites steps are as follows:

1. Set up the environment
2. Enable Private Google Access
3. Create the bucket in Google Cloud Storage
4. Get access and secret keys from the GCP web console
5. Create the DDVE image

Set up the environment

Steps

1. Use one of the following methods to install and configure Google Cloud SDK on your PC:
   - Install Google Cloud SDK on Linux. Quickstart for Linux provides instructions.
   - Install Google Cloud SDK on Windows. Quickstart for Windows provides instructions.
   - Configure Google Cloud SDK with your setup project, zone, and so on.
2. Run the **`# gcloud config list`** command and verify that the values are correct.

   NOTE: This command is applicable for deployment using Linux shell script or Windows Powershell script only.

   For example:

```
# gcloud config list
        [compute]
        region = myregion
      zone = myzone
        [core]
        account = myaccount@gmail.com
        disable_usage_reporting = True
project = myproject
```

3. Make note of the following provisioning information, which you will need for deployment:
   - Subnet ID
   - Firewall rules
   - Key-value pair or Username/Password

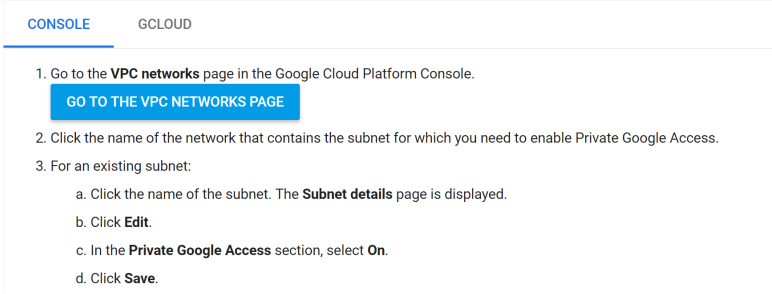
Enable Private Google Access

The DDVE object store solution needs network connectivity to the object store bucket. Enable Private Google Access to internally route the network traffic towards the bucket within the Google network.

By default, Private Google Access is not enabled. You can enable it when you create a subnet, and you can enable or disable it by editing a subnet. Configuring Private Google Access provides more information.

NOTE: We strongly recommend that you enable Private Google Access for security and efficiency. Never enable or attach a public IP address to DDVE in the cloud.

The following figure shows an excerpt of the steps required to enable Private Google Access.



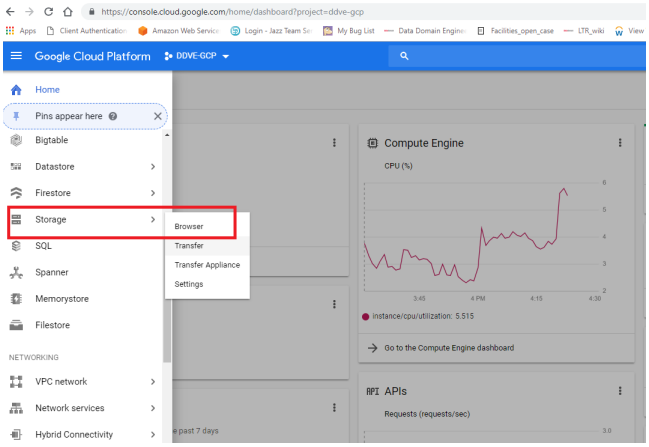
Create bucket in Google Cloud storage

About this task

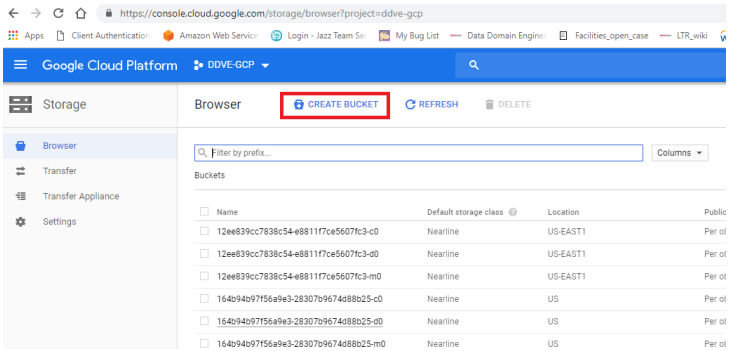
Create the bucket in the same region as the DDVE instance.

Steps

1. Navigate to **Storage** > **Browser**.



2. Click **Create Bucket**.

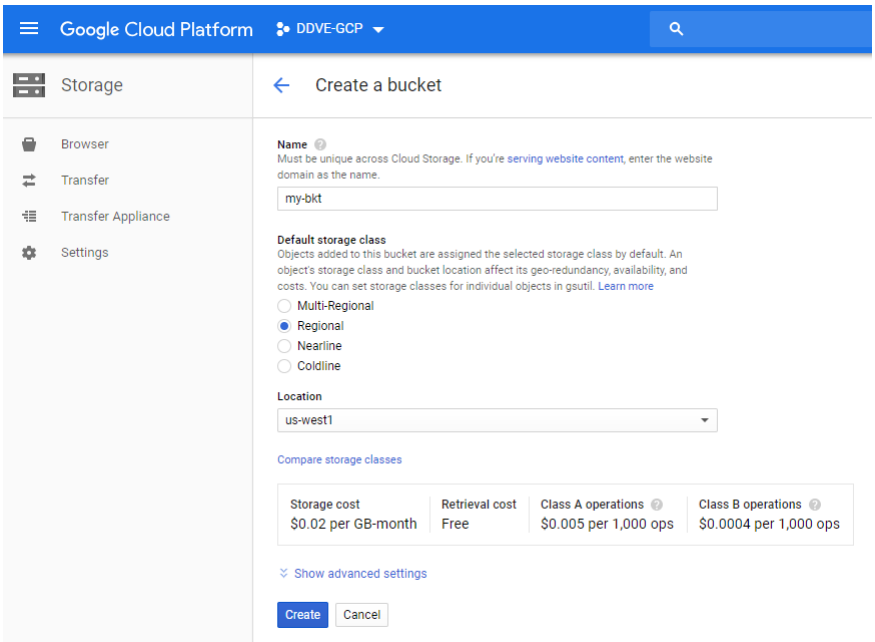


3. Enter the bucket name and other required parameters, and then click **Create**, as shown in the following figure.

   DDVE supports only Regional (recommended) or Multi-regional storage classes. Nearline and Coldline options are not supported.

   NOTE:

   - We recommend that you select the **Regional** storage class and select the same region used for the DDVE instance.
   - Use **Multi-regional** only if the user is in a location where no data centers are available as regional locations.



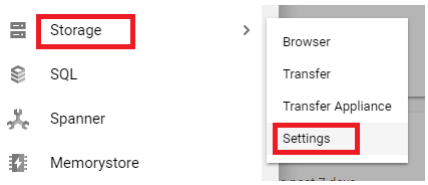
   NOTE: Alternatively, you can create a bucket using `gsutil`. Creating Storage Buckets provides instructions. Ensure that you provide the storage class as **Regional**. For Example:

```
gsutil mb -c regional -l us-east1 gs://my-bucket/
```

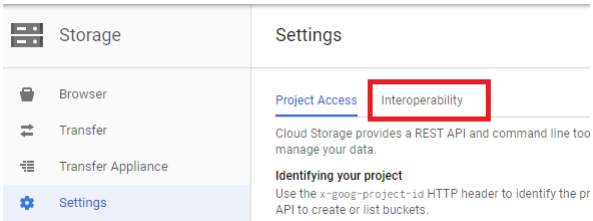
Get access and secret keys from GCP web console

Steps

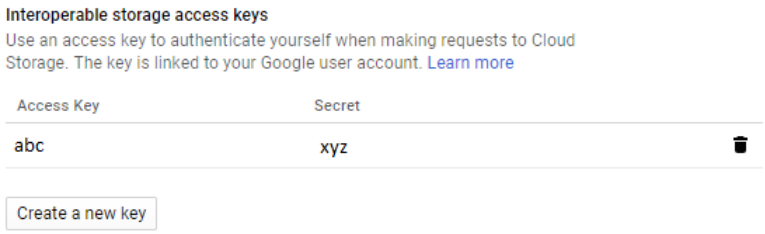
1. Login to the GCP web console.
2. Select **Storage** > **Settings**.



3. Click **Interoperability**.



4. Copy the secret and access keys from this page. If the keys do not exist, click **Create a new key** to create the keys, as shown in the following example.



NOTE: The user with these access and secret keys should be granted the *Storage Admin* role. Alternatively, for more granular access of services, the bucket-level Cloud IAM role, *storage.legacyBucketWriter* can be granted on the bucket that is created in Create Bucket in GCP. The permissions that are included in this role are:

- storage.objects.list
- storage.objects.create
- storage.objects.delete
- storage.buckets.get

For more information, see:

- Access Control Lists (ACLs): https://cloud.google.com/storage/docs/access-control/lists
- Best practices:https://cloud.google.com/storage/docs/access-control/iam#best_practices
- View and manage permissions: https://console.cloud.google.com/iam-admin/iam

Create DDVE image

About this task

Use one of the following options to create a DDVE image on GCP:

- Use the GCP web console
- Use the `gcloud` command

NOTE: Creation of an image is a one-time task. The same image can be used later to deploy multiple DDVE instances.

The DDVE for Google Cloud Platform (GCP) image package contains the DDVE root disk zip file and two deploy scripts: `gcp-deploy-linux.sh` for Linux shell and `gcp-deploy-windows.ps` for Windows PowerShell.

Complete the following before you create a DDVE image:

Steps

1. Download the DDVE image package from the Online Support site.
   For example: `ddve-gcp-6.2.0.10-xyz.zip`
2. Unzip the file to access the root disk zip file and the Linux script (**`gcp-deploy-linux.sh`**).
3. Create a bucket, for example: **bucket-1**. See Create a bucket.
4. Upload the DDVE image package to the newly created bucket with values appropriate to your own environment using the following `gsutil` command.

```
$  $  gsutil cp  ddve-gcp-6.2.0.10-xyz.tar.gz  gs://bucket-1/
```

The permissions required to run this command include:

- `storage.buckets.list`: This permission is required when uploading the image package from the GCP web console.
- `storage.objects.create`
- `storage.objects.delete`: This permission is only required when the inserted object has the same name as an object that already exists in the bucket.
- `storage.objects.list`

NOTE: Use separate buckets for uploading the image package and creating object store profile in the section Configure DDVE using CLI.

Create a DDVE image using the GCP web console

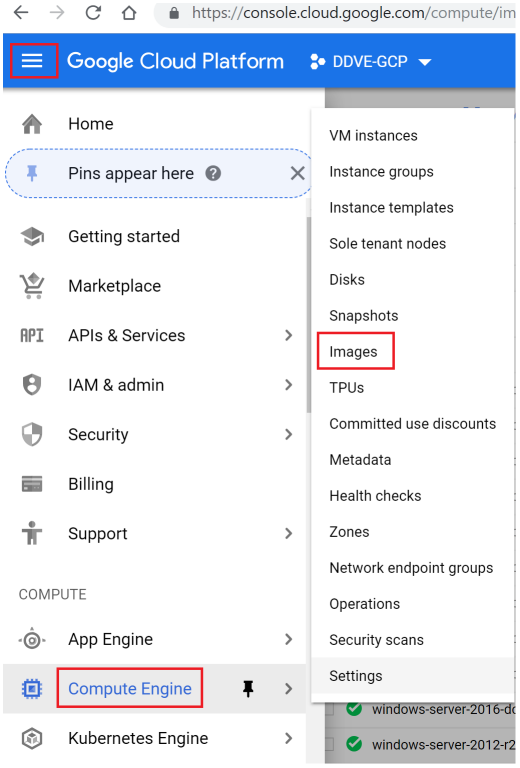
Prerequisites

The permissions required to create an image using the GCP web console include:

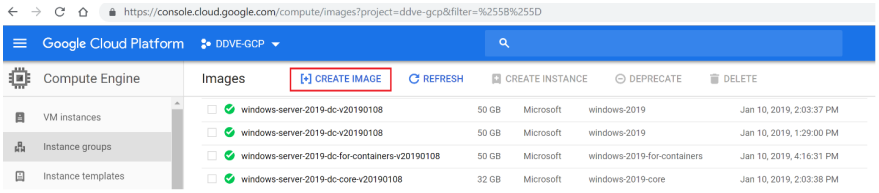
- `compute.images.create`
- `compute.images.list`
- `compute.projects.get`
- `storage.buckets.list`

Steps

1. Log in to the GCP web console.
2. Select **Compute Engine** > **Images**

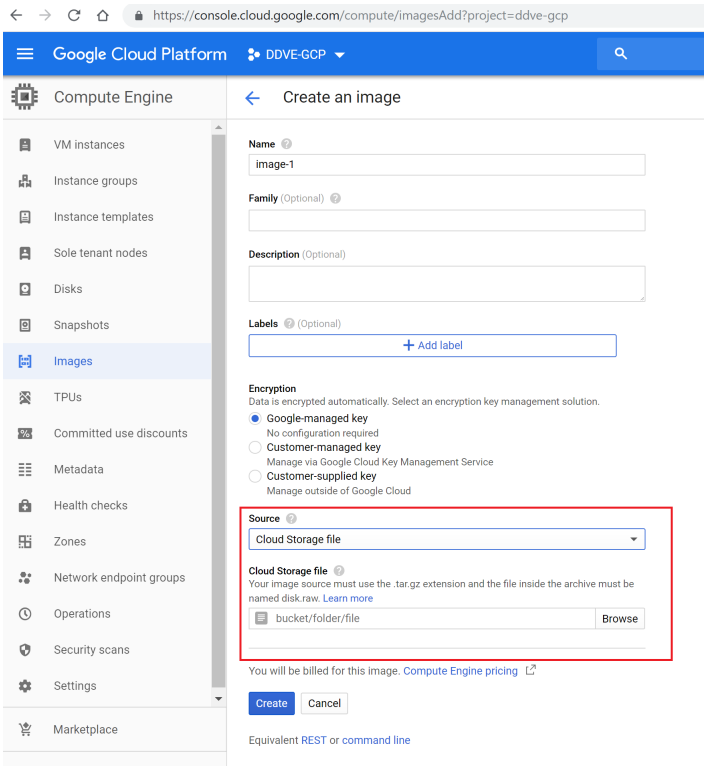


3. Click **[+]Create Image**.



4. Enter values for all the required fields, as shown in the following figure.

Under **Source**, select **Cloud Storage file** and click **Browse**. Search for the bucket you created and select the DDVE image packet, for example, `ddve-gcp-6.2.0.10-xyz.tar.gz`.



5. Click **Create.**

Create a DDVE image using the `gcloud` command

Prerequisites

The permissions required to create an image using the `gcloud` command line include:

- `compute.images.create`
- `compute.images.get`
- `storage.objects.get`

Steps

- Create your own DDVE image from `ddve-gcp-6.2.0.10-xyz.tar.gz` with values appropriate to your own environment.
  For example: `$ gcloud compute images create myimage --source-uri gs://bucket-1/ddve-gcp-6.2.0.10-xyz.tar.gz`

Deploy DDVE in GCP

Choose a method to deploy DDVE in GCP.

DDVE can be deployed in GCP using any of the following:

- Linux shell script—Strongly recommended because it automatically creates and attaches metadata disks in the correct order for DDVE according to Storage Best Practices.
- Windows PowerShell
- GCP web console

Procedures for all three methods follow.

Deploy DDVE using Linux shell script

Deploy DDVE using Linux shell script and the DDVE image you created previously.

Prerequisites

The user deploying the DDVE using the script should be granted one of the following roles:

- Compute Instance Admin
- Storage Admin*

Alternatively, the following set of permissions provide a more granular access of services. These permissions are already part of the Compute Instance Admin and the Storage Admin roles.

- `compute.disks.create`
- `compute.disks.delete`
- `compute.disks.get`
- `compute.disks.use`
- `compute.images.list`
- `compute.images.create*`
- `compute.images.get*`
- `compute.images.useReadOnly`
- `compute.instances.attachDisk`
- `compute.instances.create`
- `compute.instances.get`
- `compute.instances.list`
- `compute.instances.setMetadata`
- `compute.instances.setServiceAccount`
- `compute.machineTypes.get`
- `compute.projects.get`
- `compute.subnetworks.use`
- `compute.zones.list`
- `storage.buckets.create*`
- `storage.buckets.delete*`
- `storage.buckets.get*`
- `storage.objects.create*`
- `storage.objects.delete*`

* This role/permission is only required when using the `-f` and `-b` options for deployment.

About this task

Use the following options, as needed:

- `-n` to provide DDVE name
- `-i` to provide DDVE image name
- `-z` to provide zone
- `-v` to provide VPC name
- `-s` to provide subnet
- `-p` to provide GCP project name
- `-c` to provide desired configuration (16 TB, 32 TB, or 96 TB)
- `-o` to deploy a DDVE with Object Store. With Linux script, you don't need to provide any value for this option.
- The project and zone options are optional. If the zone or project is not specified, the system uses the default values from the `gcloud config list`.
- The script automatically creates the recommended metadata disks, per selected configuration (`-c` option). No need to add disks manually. The `-m` option can override this number.
  - For 16 TB: 2 metadata disks
  - For 32 TB: 4 metadata disks
  - For 96 TB: 10 metadata disks

Steps

- Deploy a DDVE instance using the Linux script with the following parameters. Replace the sample values with the values for your environment: `$./gcp-deploy-linux.sh -n myddve -i myimage -z myzone -v myvpc -s mysubnet -p myproject -c 96TB -o`

```
Google Cloud SDK 225.0.0
alpha 2018.11.09
beta 2018.11.09
bq 2.0.37
core 2018.11.09
gsutil 4.34
kubectl 2018.11.09
Object store configured with 10 meta data disks.

Starting deployment ...
Creating myddve-nvram disk with 10GB. It may take some time ...
Succeed.
Creating myddve-metadata1 with 1TB. It may take some time ...
Succeed.
Creating myddve-metadata2 with 1TB. It may take some time ...
Succeed.
Creating myddve-metadata3 with 1TB. It may take some time ...
Succeed.
Creating myddve-metadata4 with 1TB. It may take some time ...
Succeed.
Creating myddve-metadata5 with 1TB. It may take some time ...
Succeed.
Creating myddve-metadata6 with 1TB. It may take some time ...
Succeed.
Creating myddve-metadata7 with 1TB. It may take some time ...
Succeed.
Creating myddve-metadata8 with 1TB. It may take some time ...
Succeed.
Creating myddve-metadata9 with 1TB. It may take some time ...
Succeed.
Creating myddve-metadata10 with 1TB. It may take some time ...
Succeed.
Creating DDVE ...
Succeed.

Summary:
========================================
   DDVE name: myddve
         cpu: 16 cores
      memory: 64GB
    capacity: 96TB
   image name: myimage
      project: myproject
         zone: myzone
     vpc name: myvpc
 subnets name: mysubnet
   private IP: myIP
   Object store configured:
       number of metadisks: 10
       size of metadisks:   1TB
========================================
$
```

Deploy DDVE using Windows PowerShell script

Deploy DDVE using Windows PowerShell script and the DDVE image you created previously.

Prerequisites

The permissions required to deploy a DDVE using the PowerShell script are the same as for Deploy DDVE using Linux shell script on page 15.

Steps

1. Start Windows PowerShell with the **`Run as Administrator`** option.

   Only members of the Administrators group on the computer can change the execution policy.

2. Enable running unsigned scripts by entering `set-executionpolicy remotesigned`

   Microsoft Running Scripts provides more information.

3. Run the following command from Windows PowerShell, replacing the sample values with the values for your environment.

   ```
   # .\gcp-deploy-windows.ps1 -n myddve0 -i myimage -z myzone -v myvpc -s mysubnet -p
   myproject -c 96TB -o 1.
   ```

   Use the following options, as needed:

   - `-n` to provide DDVE name
   - `-i` to provide DDVE image name
   - `-z` to provide zone
   - `-v` to provide VPC name
   - `-s` to provide subnet
   - `-p` to provide GCP project name
   - `-c` to provide desired configuration (16 TB, 32 TB, or 96 TB)
   - `-o` to deploy a DDVE with Object Store. For Windows Powershell script, the value of this option is always 1.

   For example,

```
#.\gcp-deploy-windows.ps1 -n myddve0 -i my-image -z myzone -v myvpc -s mysubnet -p my-
project -c 96TB -o 1
Google Cloud SDK 232.0.0
bq 2.0.40
core 2019.01.27
gsutil 4.35

Starting deployment ...
Creating nvram disk. It may take some time ...
Created [https://www.googleapis.com/compute/v1/projects/my-project/zones/myzone/disks/
myddve0-nvram].

New disks are unformatted. You must format and mount a disk before it
can be used. You can find instructions on how to do this at:

https://cloud.google.com/compute/docs/disks/add-persistent-disk#formatting

Succeed.
Creating myddve0-metadata1. It may take some time ...
Created [https://www.googleapis.com/compute/v1/projects/my-project/zones/myzone/disks/
myddve0-metadata1].

New disks are unformatted. You must format and mount a disk before it
can be used. You can find instructions on how to do this at:

https://cloud.google.com/compute/docs/disks/add-persistent-disk#formatting

Succeed.
Creating myddve0-metadata2. It may take some time ...
Created [https://www.googleapis.com/compute/v1/projects/my-project/zones/myzone/disks/
myddve0-metadata2].

New disks are unformatted. You must format and mount a disk before it
can be used. You can find instructions on how to do this at:

https://cloud.google.com/compute/docs/disks/add-persistent-disk#formatting

Succeed.
Creating myddve0-metadata3. It may take some time ...
Created [https://www.googleapis.com/compute/v1/projects/my-project/zones/myzone/disks/
myddve0-metadata3].

New disks are unformatted. You must format and mount a disk before it
can be used. You can find instructions on how to do this at:
```

```
https://cloud.google.com/compute/docs/disks/add-persistent-disk#formatting

Succeed.
Creating myddve0-metadata4. It may take some time ...
Created [https://www.googleapis.com/compute/v1/projects/my-project/zones/myzone/disks/
myddve0-metadata4].

New disks are unformatted. You must format and mount a disk before it
can be used. You can find instructions on how to do this at:

https://cloud.google.com/compute/docs/disks/add-persistent-disk#formatting

Succeed.
Creating myddve0-metadata5. It may take some time ...
Created [https://www.googleapis.com/compute/v1/projects/my-project/zones/myzone/disks/
myddve0-metadata5].

New disks are unformatted. You must format and mount a disk before it
can be used. You can find instructions on how to do this at:

https://cloud.google.com/compute/docs/disks/add-persistent-disk#formatting

Succeed.
Creating myddve0-metadata6. It may take some time ...
Created [https://www.googleapis.com/compute/v1/projects/my-project/zones/myzone/disks/
myddve0-metadata6].

New disks are unformatted. You must format and mount a disk before it
can be used. You can find instructions on how to do this at:

https://cloud.google.com/compute/docs/disks/add-persistent-disk#formatting

Succeed.
Creating myddve0-metadata7. It may take some time ...
Created [https://www.googleapis.com/compute/v1/projects/my-project/zones/myzone/disks/
myddve0-metadata7].

New disks are unformatted. You must format and mount a disk before it
can be used. You can find instructions on how to do this at:

https://cloud.google.com/compute/docs/disks/add-persistent-disk#formatting

Succeed.
Creating myddve0-metadata8. It may take some time ...
Created [https://www.googleapis.com/compute/v1/projects/my-project/zones/myzone/disks/
myddve0-metadata8].

New disks are unformatted. You must format and mount a disk before it
can be used. You can find instructions on how to do this at:

https://cloud.google.com/compute/docs/disks/add-persistent-disk#formatting

Succeed.
Creating myddve0-metadata9. It may take some time ...
Created [https://www.googleapis.com/compute/v1/projects/my-project/zones/myzone/disks/
myddve0-metadata9].

New disks are unformatted. You must format and mount a disk before it
can be used. You can find instructions on how to do this at:

https://cloud.google.com/compute/docs/disks/add-persistent-disk#formatting

Succeed.
Creating myddve0-metadata10. It may take some time ...
Created [https://www.googleapis.com/compute/v1/projects/my-project/zones/myzone/disks/
myddve0-metadata10].

New disks are unformatted. You must format and mount a disk before it
can be used. You can find instructions on how to do this at:

https://cloud.google.com/compute/docs/disks/add-persistent-disk#formatting

Succeed.
```

```
Creating DDVE ...
Created [https://www.googleapis.com/compute/v1/projects/my-project/zones/myzone/
instances/myddve0].
Succeed.
Attaching myddve0-metadata1. It may take some time ...
Updated [https://www.googleapis.com/compute/v1/projects/my-project/zones/myzone/
instances/myddve0].
Succeed.
Attaching myddve0-metadata2. It may take some time ...
Updated [https://www.googleapis.com/compute/v1/projects/my-project/zones/myzone/
instances/myddve0].
Succeed.
Attaching myddve0-metadata3. It may take some time ...
Updated [https://www.googleapis.com/compute/v1/projects/my-project/zones/myzone/
instances/myddve0].
Succeed.
Attaching myddve0-metadata4. It may take some time ...
Updated [https://www.googleapis.com/compute/v1/projects/my-project/zones/myzone/
instances/myddve0].
Succeed.
Attaching myddve0-metadata5. It may take some time ...
Updated [https://www.googleapis.com/compute/v1/projects/my-project/zones/myzone/
instances/myddve0].
Succeed.
Attaching myddve0-metadata6. It may take some time ...
Updated [https://www.googleapis.com/compute/v1/projects/my-project/zones/myzone/
instances/myddve0].
Succeed.
Attaching myddve0-metadata7. It may take some time ...
Updated [https://www.googleapis.com/compute/v1/projects/my-project/zones/myzone/
instances/myddve0].
Succeed.
Attaching myddve0-metadata8. It may take some time ...
Updated [https://www.googleapis.com/compute/v1/projects/my-project/zones/myzone/
instances/myddve0].
Succeed.
Attaching myddve0-metadata9. It may take some time ...
Updated [https://www.googleapis.com/compute/v1/projects/my-project/zones/myzone/
instances/myddve0].
Succeed.
Attaching myddve0-metadata10. It may take some time ...
Updated [https://www.googleapis.com/compute/v1/projects/my-project/zones/myzone/
instances/myddve0].
Succeed.
Summary:
========================================
   DDVE name: myddve0
           cpu: 16 cores
        memory: 64GB
      capacity: 96TB
   image name: my-image
       project: my-project
          zone: myzone
      vpc name: myvpc
 subnets name: mysubnet
   private IP: 10.10.11.52
   Object store configured:
       number of metadisks: 10
         size of metadisks: 1TB
========================================
```

Deploy DDVE from the GCP Web Console

Deploy DDVE from the GCP Web console using the DDVE image you created previously.

Prerequisites

The user that deploys DDVE from the GCP Web Console should be granted the role *Compute Instance Admin*.

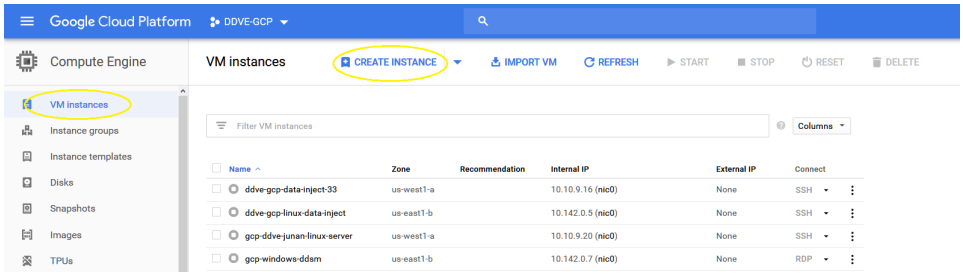
Alternatively, for more granular access of services, the *Compute Viewer* role and the following set of additional permissions can be granted:

- `compute.disks.create`
- `compute.disks.use`
- `compute.images.useReadOnly`
- `compute.instances.create`
- `compute.subnetworks.use`

Google Cloud Understanding Engine Roles provides more information.

Steps

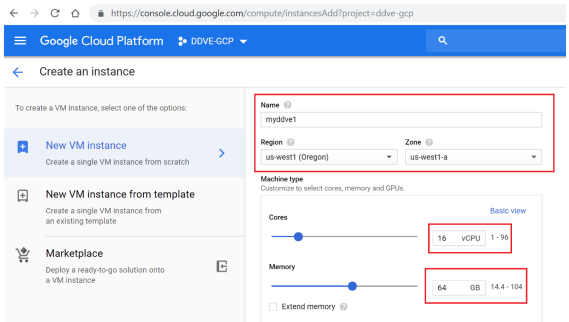
1. Login to the GCP console at https://console.cloud.google.com.
2. Create the DDVE instance from the image.
   a. Click **CREATE INSTANCE** to launch virtual machine creation.



   b. Specify the virtual machine name, select the zone where the VPC and subnet are created, and customize the CPU and memory to the required values based on the configuration type you want to deploy.

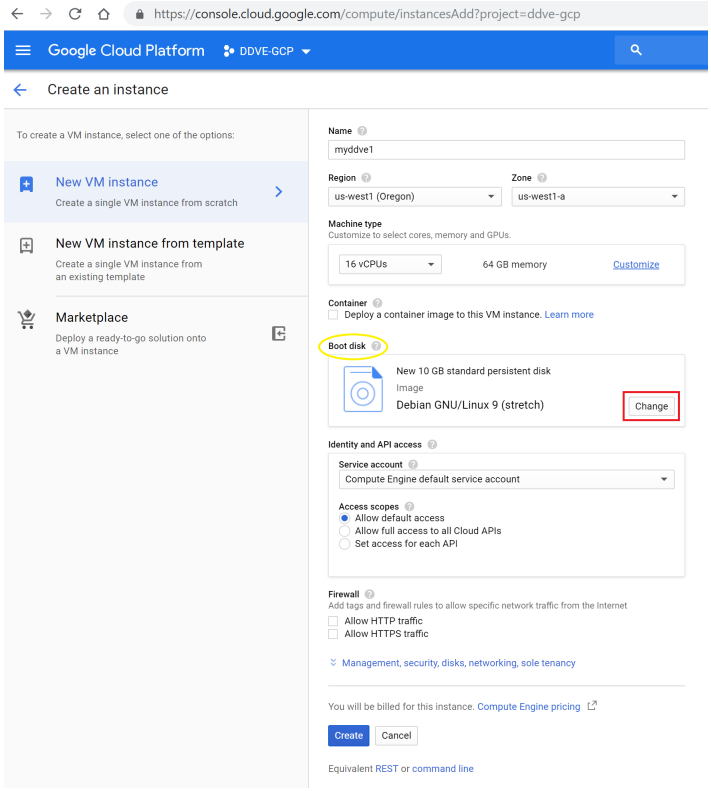
      Storage Best Practices provides more information about supported configurations.

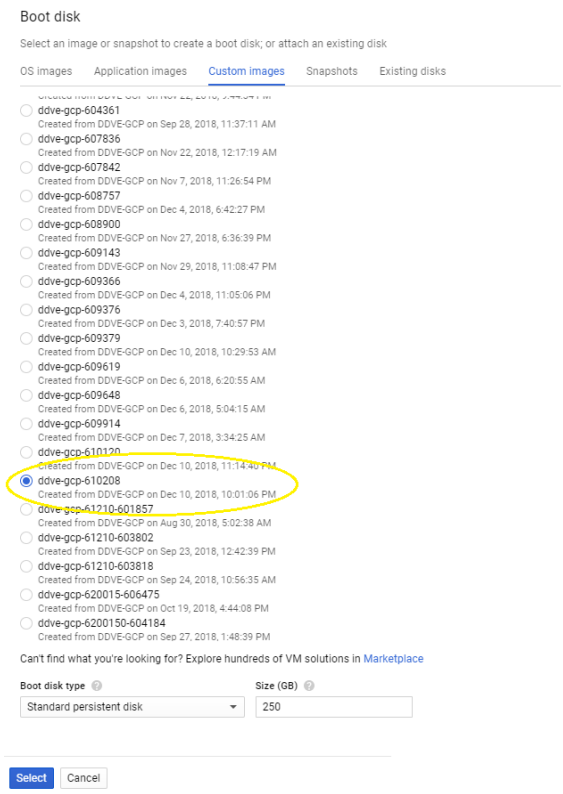
      For example: Customize CPU to 16 cores and memory to 64 GB for a 96 TB DDVE instance.



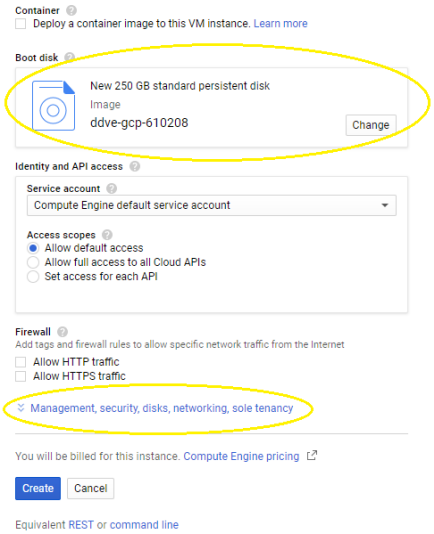
   c. Under **Boot Disk**, click **Change** > **Custom Images** and select the DDVE image as the boot disk.

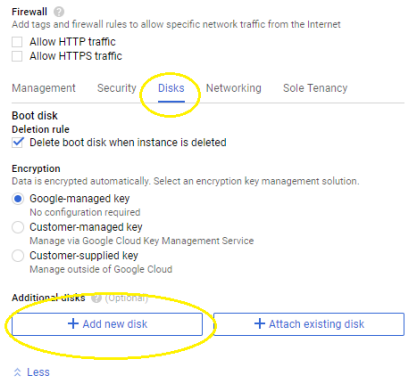
Verify that the disk type is **Standard Persistent Disk** and the size is 250 GB.



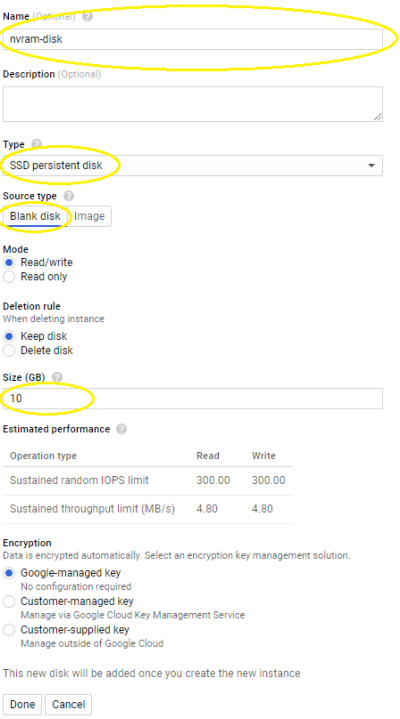


d. To create the NVRAM disk, on the bottom of the screen, click **Management, security, disks, networking, sole tenancy** > **Disks** > **Add new disk**.





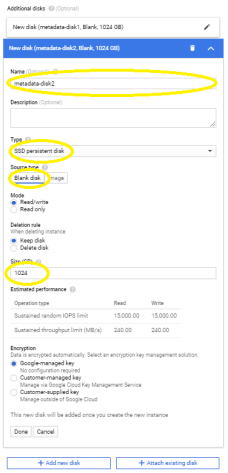
e. Specify the NVRAM disk name, select **SSD persistent disk** for the disk type, select **Blank disk** for the source type, and set the disk size to 10 GB.



f. Add metadata disks to the DDVE instance.

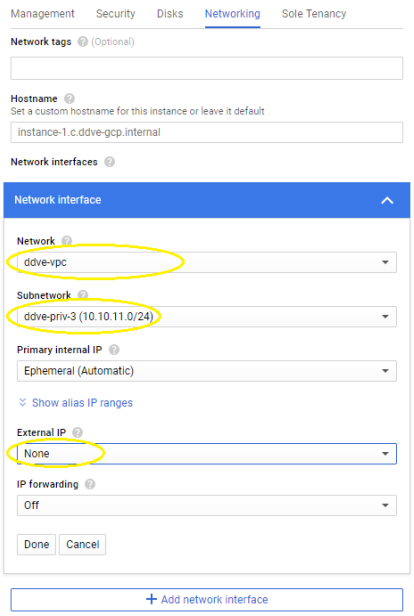
The recommended number of metadata disks by capacity is:

- For 16 TB: 2
- For 32 TB: 4
- For 96 TB: 10

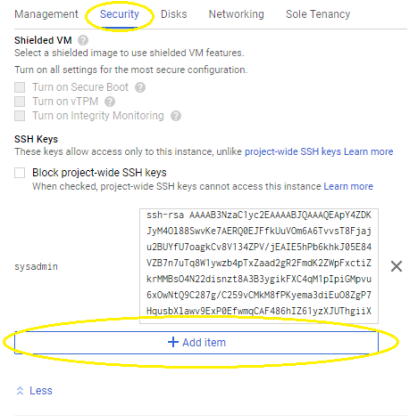


NOTE: The number of metadata disks you need to add depends on the assumption of 20x overall dedup ratio (10x dedup and 2x compression). For workloads with higher dedup ratio, more metadata storage is needed.

g. From the **Networking** tab, for **Network**, select your VPC and for **Subnetwork**, select your subnet. If you have already setup your own jump box in this subnet and want to access the DDVE only through the jump box, set **External IP** to **None**.



h. (Optional) When you deploy from the Google Cloud Console, DDVE supports assigning an SSH key for the sysadmin user.

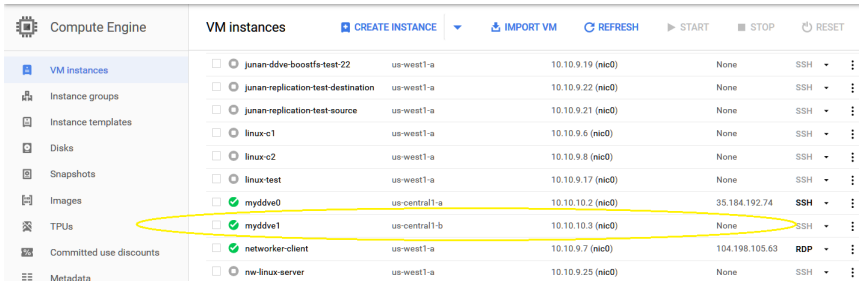


NOTE:

- Click **Add item** to add more SSH keys to DDVE.
- The SSH key is only for the `sysadmin user`.

i. Deploy the DDVE.

The DDVE instance appears when the deployment completes.



3

Completing Initial DDVE Configuration

This chapter includes the following topics:

Topics:

Configure DDVE in GCP

About this task

There are two ways to configure a DDVE after deployment:

- Using DDSM Interface
- Using the CLI

Before you begin:

- Consider metadata storage size and count requirements. Refer to Storage Best Practices for additional information.
- Create the GCP storage bucket. Make note of the bucket name, as you will need it when you create the cloud profile.
- If the storage class is selected as **regional**, we recommend that you create the bucket in the same region as the DDVE instance.

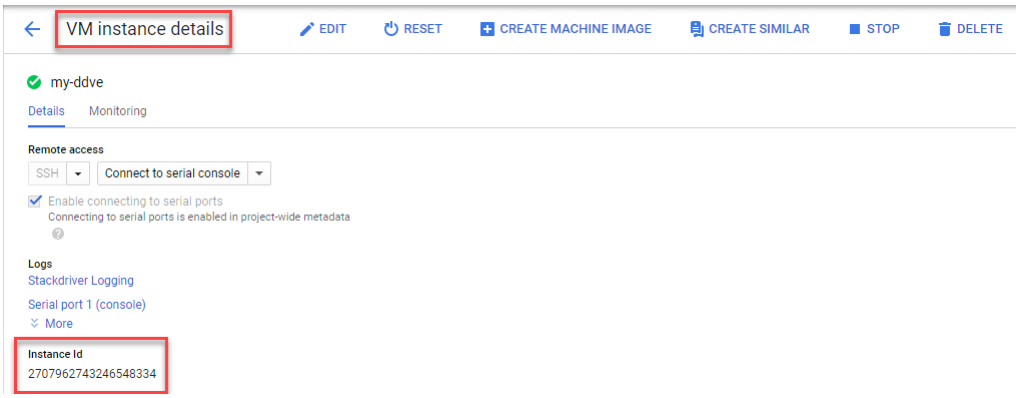
Configure DDVE in GCP using DDSM

You can configure DDVE in GCP using the DDSM UI.

Steps

1. Log in to DD System Manager using the IP address of your DDVE. The default login credentials for the DDVE instance are: sysadmin/*<Instance_Id>*.

   NOTE: You can find the **Instance Id** from the **VM instance details** on the GCP portal.



2. From the **Use** list, select one of the following licenses:
   - Pre-Installed Evaluation License (provides 45 days of limited access to DDVE software for evaluation purposes and may only be used in a non-production environment.)
   - License File

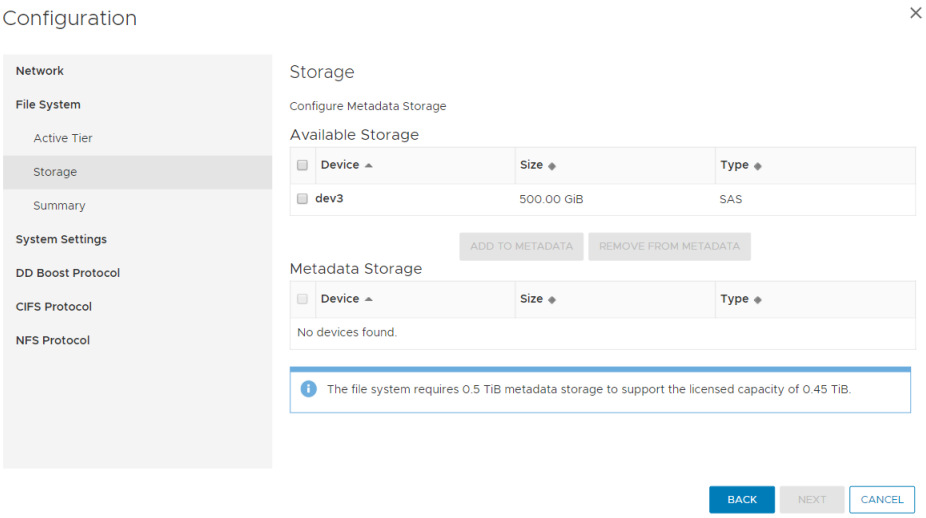
- License Server (Alternative choice, if license server is available)

3. Accept the End User License Agreement.
   The configuration wizard is launched automatically.
4. Leave the default Network settings. Click **No** to go to the File System Settings.
5. Click **Yes** for **File System** configuration.
6. For **Storage Type**, select **Object Store**, enter the passphrase, bucket name, access key, and secret key.
   These fields are not displayed after the passphrase is set.

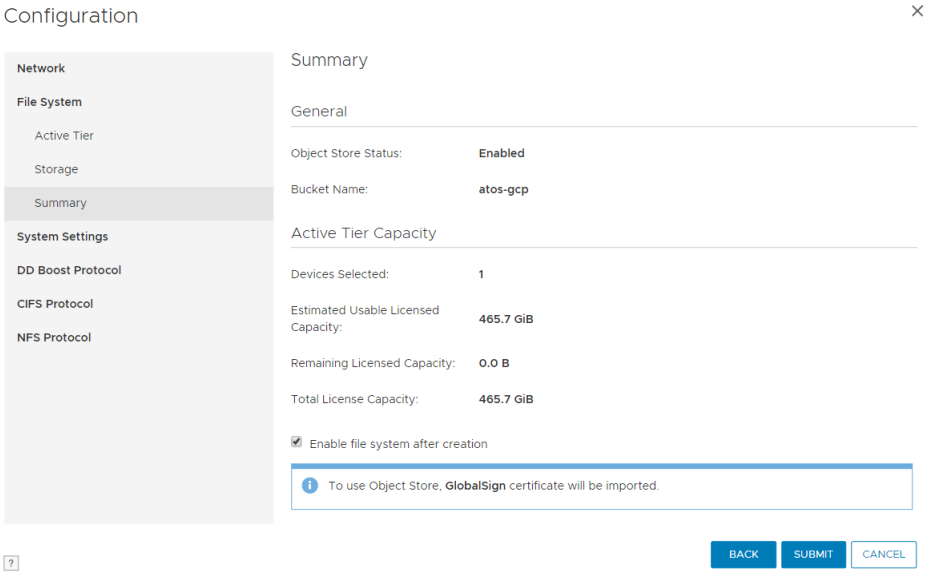
   NOTE:

   - Create bucket in Google Cloud Storage provides steps to create a bucket.
   - Getting Access and Secret Keys from GCP Web Console provides steps to get the access key and secret key.

7. Configure Storage. Select the disks under **Available Storage** and move them to the **Metadata Storage** section by clicking **Add to Metadata**. Add the disks to the active tier (this action adds the metadata storage disk to the instance).

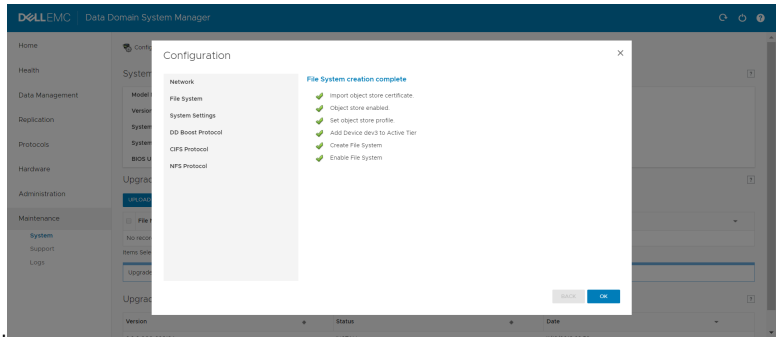


8. File System Summary Page: Click the Summary tab to review all the fields. Check the box **Enable file system** after creation

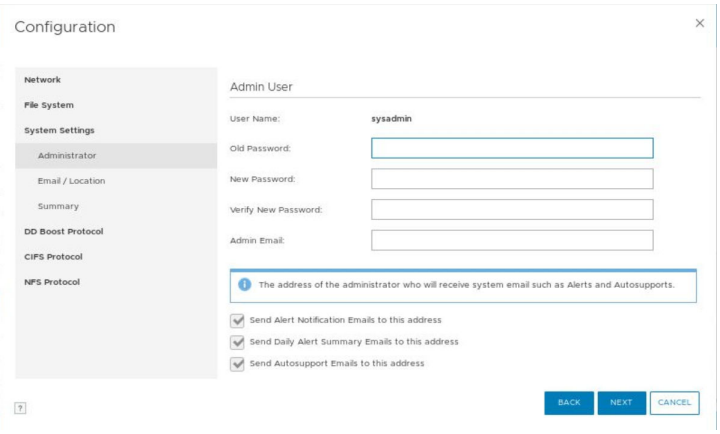


and click **Submit**.

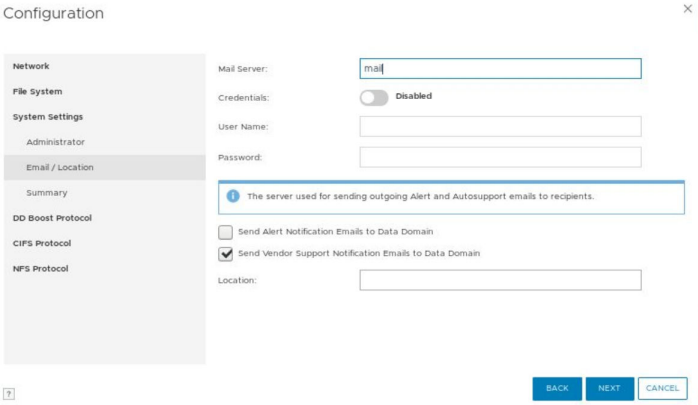
The file system is created and enabled.



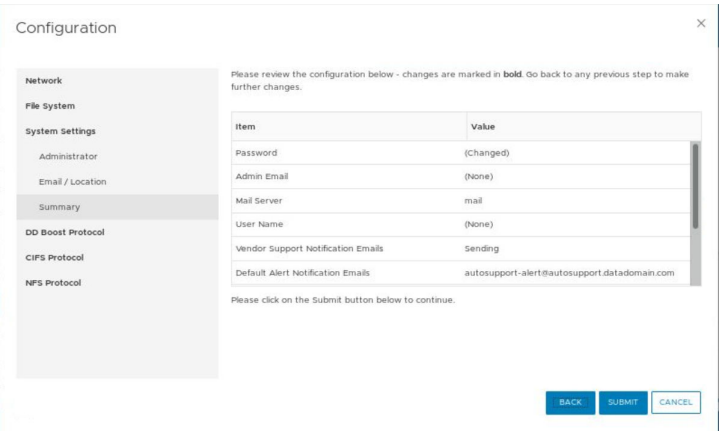
9. Click **OK** to go to the **System Settings** tab.
10. Change the DDVE password.



11. Configure the email server as needed.



12. Click **Submit** to save the system settings, and then exit the wizard.



NOTE: DDVE running in GCP must have its clock synchronized with NTP for object store communication. DDVE automatically synchronizes its clock using the time server information in the DHCP response that the GCP infrastructure provides. If there are any changes in the GCP setup that prevent the NTP server announcement, configure and check the NTP status by going to **Administration** > **Settings** > **More Tasks** > **Configure Time Settings**. See Google Set up network time protocol (NTP) for instances.

Results

The DDVE configuration using DDSM is complete.

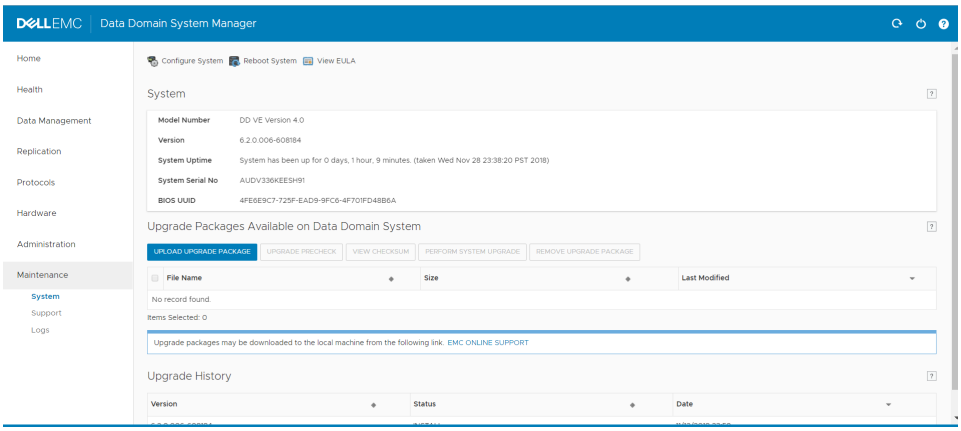
Re-launch the configuration wizard

About this task

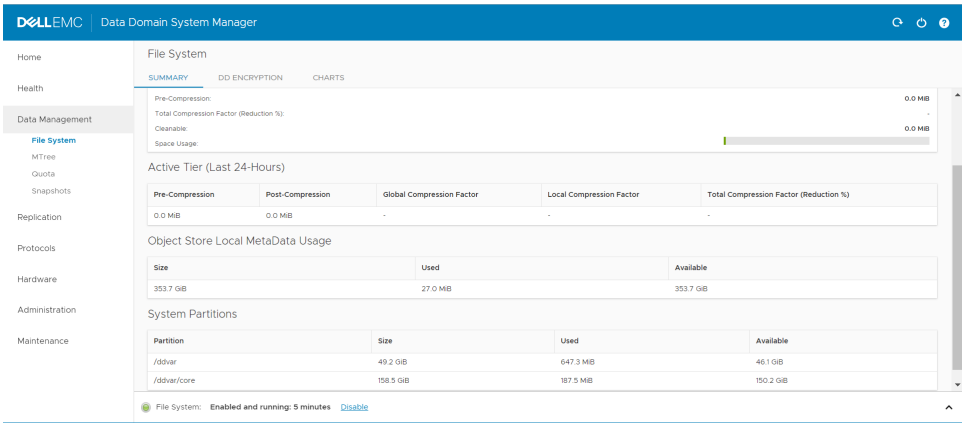
You will need to re-launch the configuration wizard after completing the initial DDVE configuration, if you choose to modify the object-store profile or make other changes after this initial configuration.

Steps

1. Navigate to `Maintenance >System`.
2. Click on the **Configuration System** option.



3. Object store local metadata storage can be checked by navigating to `Data Management>File System`.



Configure DDVE in GCP using CLI

You can log in using SSH to configure DDVE using the command line interface. Authentication using key-value pair and username/password are supported.

Steps

1. Log in to the DDVE instance to configure the system. The default login credentials for the DDVE instance are: sysadmin/changeme.

```
# ssh sysadmin@<IP address of DDVE>
EMC DD Virtual Edition
Password:

Welcome to DD OS 6.2.0.10-xyz
-----------------------------------------
sysadmin@myddve0#
```

2. During the first login, you are prompted to accept the EULA and change the password.

   The configuration wizard is be launched.

3. Follow the steps in the wizard to add the elicense and configure the Object Store.

   NOTE: If an elicense file cannot be found in `/ddr/var` you can paste the license directly in the wizard.

```
Welcome to DD OS 6.2.0.10-614837
-----------------------------------------
        Do you want to configure system using GUI wizard (yes|no) [no]:

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

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

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


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

Pending eLicense Settings
Existing Licenses:
        Capacity licenses:
        ##   Feature    Capacity    Type              State    Expiration Date   Note
        --   --------   ---------   ---------------   ------   ---------------   ----
        1    CAPACITY   87.31 TiB   permanent (int)   active   n/a
        --   --------   ---------   ---------------   ------   ---------------   ----


________** System is using internal licenses.


New Licenses:
        Capacity licenses:
        ##   Feature    Capacity    Type              State    Expiration Date   Note
        --   --------   ---------   ---------------   ------   ---------------   ----
        1    CAPACITY   87.31 TiB   permanent (int)   active   n/a
        --   --------   ---------   ---------------   ------   ---------------   ----


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

```
Successfully updated eLicenses.

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

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

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

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

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


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

        Do you want to enable object store (yes|no)
        [yes]:
A passphrase needs to be set on the system.
Enter new passphrase:
Re-enter new passphrase:
Passphrases matched.
Config object store
        Enter the access key:
        Enter the secret key:
        Enter the bucket name: simp-test-bucket

        Object-store endpoint needs the GlobalSign certificate to be imported.
        Do you want to import that certificate with below fingerprint?
        75:E0:AB:B6:13:85:12:27:1C:04:F8:5F:DD:DE:38:E4:B7:24:2E:FE  (yes|no) [yes]:

Pending Object Store Settings
        Bucket name: simp-test-bucket

        Do you want to save these settings (Save|Cancel|Retry): Save
The passphrase is set

Successfully set object store profile.

Configuration complete.
```

4. Run the following command to view the disks attached to the DDVE:

```
# disk show hardware

Example:

# disk show hardware
Disk   Slot        Manufacturer/Model         Firmware   Serial No.   Capacity    Type
       (pci/idx)
----   ---------   ------------------------   --------   ----------   ---------
-------
dev1   0:0         Google  PersistentDisk     n/a        (unknown)    250.0 GiB   SAS
dev2   0:1         Google  PersistentDisk     n/a        (unknown)    10.0 GiB    SAS-
SSD
dev3   0:2         Google  PersistentDisk     n/a        (unknown)    1.0 TiB     SAS-
SSD
dev4   0:3         Google  PersistentDisk     n/a        (unknown)    1.0 TiB     SAS-
SSD
----   ---------   ------------------------   --------   ----------   ---------
-------
4 drives present.
```

5. Add the disks to the active tier. This would be the metadata storage disk added to the instance.

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

6. Create and enable file system

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

NOTE: DDVE running in GCP must have its clock synchronized with NTP for successful object store communication. The DDVE automatically synchronizes its clock using the time server information in DHCP response provided by the GCP infrastructure. If there are any changes in GCP setup that prevents NTP server announcement, configure NTP explicitly by using `ntp add timeserver <server>` and `ntp sync` commands. You can check the NTP status for your instance by running the command `ntp status`

Refer to Google set up network time protocol (NTP) for instances for more information on GCP time synchronization.

Results

The DDVE configuration using CLI is complete.

Configure DDVE manually

You can manually configure the DDVE if the configuration wizard was skipped or at any point after the initial configuration.

About this task

This procedure enables you to configure or update the elicense, set the system passphrase, enable the object-store feature, and set the object-store profile.

Steps

1. To add the elicense, save the license file to `/ddr/var/license`. Run the command `elicense update license.lic`.

   NOTE: if the license file cannot be found in `/ddr/var`, you can paste its content directly to the console.

```
# elicense update license.lic

Existing licenses:

Capacity licenses:
##   Feature    Capacity   Type                   State    Expiration Date   Note
--   --------   --------   --------------------   ------   ---------------   ----
1    CAPACITY   0.45 TiB   unexpired evaluation   active   n/a
--   --------   --------   --------------------   ------   ---------------   ----

Feature licenses:
##   Feature                      Count   Type                    State    Expiration
Date   Note
--   -------------------------   -----   --------------------   ------
---------------   ----
1    REPLICATION                      1   unexpired evaluation   active   n/a
2    DDBOOST                          1   unexpired evaluation   active   n/a
3    RETENTION-LOCK-GOVERNANCE        1   unexpired evaluation   active   n/a
4    ENCRYPTION                       1   unexpired evaluation   active   n/a
--   -------------------------   -----   --------------------   ------
---------------   ----

New licenses:

Capacity licenses:
##   Feature    Capacity    Type              State    Expiration Date   Note
--   --------   ---------   ---------------   ------   ---------------   ----
1    CAPACITY   87.31 TiB   permanent (int)   active   n/a
--   --------   ---------   ---------------   ------   ---------------   ----
```

```
Feature licenses:
##   Feature       Count   Type              State    Expiration Date   Note
--   -----------   -----   ---------------   ------   ---------------   ----
1    REPLICATION       1   permanent (int)   active   n/a
2    DDBOOST           1   permanent (int)   active   n/a
3    ENCRYPTION        1   permanent (int)   active   n/a
--   -----------   -----   ---------------   ------   ---------------   ----

        ** New license(s) will overwrite all existing license(s).

        Do you want to proceed? (yes|no) [yes]: yes


eLicense(s) updated.
```

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

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

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

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

4. Get the access and secret keys by following the steps in Getting Access and Secret Keys from GCP Web Console.
5. Run the following command to create/modify the cloud profile: `# storage object-store profile set`. Enter the access and secret keys obtained from the previous step.
6. Enter the bucket name created in step Create bucket in Google Cloud Storage.
7. GCP needs the GlobalSign certificate to communicate with the object store. Import the certificate using the following command:

```
# storage object-store profile set
Enter the access key: <enter your GCP access key>
Enter the secret key: <enter your GCP secret key>
Enter the bucket name: my-bkt

Object-store endpoint needs the GlobalSign certificate to be imported.
Do you want to import that certificate with below fingerprint?
75:E0:AB:B6:13:85:12:27:1C:04:F8:5F:DD:DE:38:E4:B7:24:2E:FE  (yes|no) [yes]: yes

Profile is set.
#
```

Recovering DDVE using system headswap

A system headswap recovers a DDVE instance from a head unit failure. The head unit refers to the DDVE root disk.

Prerequisites

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

About this task

Use this procedure only to run the system headswap command to recover DDVE with a head unit failure in GCP Object Store.

NOTE: The failed instance is referred to as instance A. The new instance is instance B.

Steps

1. Create instance B with Head Unit (root disk only) with the same instance type as the original one.
2. Detach the vNVRAM and metadata disks from the failed head unit (instance A).
3. Attach the vNVRAM and metadata disks that were detached from instance A to instance B
4. Set the system passphrase.

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

```
# system passphrase set

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

5. Ensure that system A is powered off.

   This step is required to detach the bucket from system A and make it available to be attached with system B.
6. Run the system headswap command on instance B.

   NOTE: The system will reboot during the headswap process.

```
# system headswap

This command returns the system back to its prior operational
conditions. The system will be rebooted before
resuming normal operations.

**   If system passphrase was set on the old head, you will
     need to do one of the following after headswap completes:
     - unlock the filesystem          if you have encrypted data, or
     - set the system passphrase      if you don't have encrypted data

        Are you sure? (yes|no) [no]: yes

ok, proceeding.

Please enter sysadmin password to confirm 'system headswap':
Restoring the system configuration, do not power off / interrupt process ...

#
Broadcast message from root (Fri May 25 07:12:35 2018):
The system is going down for reboot NOW!
```

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

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

NOTE:

- You might need to re-activate the license on the new instance if an unserved-mode license is used.
- Use the CLI `elicense checkout` and `elicense checkin` to obtain licenses from DDVE
  - If an `invalid key magic` error occurs after a headswap, set the passphrase on the new DDVE, and then perform the headswap using `ddboost user revoke token-access sysadmin`.
  - If DDVE was attached to an AV-server and a certificate authentication error occurs after a headswap, detach and re-attach the DD from the AV-server. The AV-server regenerates the certificate and imports it to DD.

Recovering the DDVE instance

Use this procedure only when you lose the original DDVE instance and must recover data to a new DDVE instance.

About this task

This procedure recovers the DDVE system on the GCP Object Store. The system recovery command recovers the DDVE with failure of the head unit, NVRAM disk, metadata disk, or any combination of the three.

If both NVRAM and metadata disks are available, use the `system headswap` command instead.

Steps

1. Create instance B with the same configuration as instance A, including instance type, and metadata disk capacity.
2. Use the following command to enable the object-store:

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

3. Set the object-store profile.

   Ensure that the passphrase on system B matches that on system A. Otherwise, the recovery fails. Also, ensure that the bucket name for both systems is the same.
4. Run the command to verify the disks that are attached to the DDVE: `# disk show hardware`.
5. Add disks to the active tier: `# storage add tier active dev<n>`

   NOTE: Add disks with at least the same capacity as system A.
6. Run system recovery precheck:

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

7. Run the recovery:

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

8. Check the recovery status.

   The system reboots during the recovery process.

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

9. After the recovery process is complete, check the file system status.

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

4

Administering DDVE

This chapter includes the following topics:

Topics:

Adding virtual storage

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

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

Using the GUI

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

Using the CLI

Extensions to DDOS for DDVE

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

perf

Collect and show DDVE performance statistics.

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

Disable tracing of specified events.

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

Enable tracing of the specified events.

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

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

`perf start stats`

Start printing statistics. This command may reduce performance marginally.

`perf start trace [allow-wrap] [module {default | ddfs}]`

Start tracing events. This command may reduce performance marginally.

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

Shows whether tracing is enabled or disabled for the specified events.

`perf stop histogram histogram-filename [module {default | ddfs}`

Stop collecting histograms and write the collected histograms to the specified file.

`perf stop stats`

Stop printing statistics.

`perf stop trace trace-filename [module {default | ddfs}]`

Stop tracing events and write the collected traces to the specified file.

system vresource

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

```
sysadmin@zx-benmark-1# system vresource show requirements
  Active Tier      Cloud Tier                                        Instance
Capacity (TB)   Capacity (TB)                                           Type
-------------   -------------   ---------------------------------------------
            8             n/a   Standard_F4 (Only block storage is supported)
           16             n/a                                     Standard_F8
           32             n/a                                  Standard_D4_v2
           96             n/a                                 Standard_D16_v3
          256             n/a                               Standard_D32s_v3
-------------   -------------   ---------------------------------------------
** The maximum allowed system capacity for active tier on block storage is 16 TB
```

DDVE-only commands

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

Table 3. DDVE-only commands

Command	Description
`elicense checkout feature-license <feature-name-list>`	Allows user to check out the features of licenses for License Server installation
`elicense checkout capacity-license <feature-name> value <n> {TB|GB}`	Allows user to check out the capacity of licenses for License Server installation. Here is sample output: `sysadmin@localhost# elic checkout capacity-license capacity value 10 TB Checking out CAPACITY license willl also checkout available feature licenses. An addition 10 TB CAPACITY license will be checked out. 10 TB additional CAPACITY license has been checked out. License(s) have been checked out for REPLICATION, DDBOOST, ENCRYPTION. Total 10 TB CAPACITY license is now available on this system.`
`elicense checkin {<feature-name-list>| all}`	Allows user to check in features for licences for License Server installation
`elicense license-server set server {<ipaddr> | <hostname>} port <port-number>`	
`elicense license-server reset`	Returns DDVE to factory license settings.
`elicense license-server show`	
`filesys show space tier active local-metadata`	Displays the usage for the metadata storage. **NOTE:** Some portion of the disk space is reserved for internal metadata, such as index. The amount of space is

Table 3. DDVE-only commands (continued)

Command	Description
	based on the maximum capacity of the platform and not on licensed capacity.
`net hosts add`	Two DDVEs in different regions cannot resolve each other's hostname. Run this command to add a host list entry. **NOTE:** For VNET to VNET connection between different regions in Azure, see Microsoft.com.
`storage object-store enable`	Enables the object-store feature for DDVE.
`storage object-store disable`	Disables the object-store feature for DDVE.
`storage object-store profile set`	Configures the object-store access profile.
`storage object-store profile show`	Displays the object-store access profile.
`storage object-store profile status`	This CLI lists the object-store profile information set on the DDVE.
`system vresource show [requirements]`	Displays the file system capacity, the number of virtual CPUs, and the amount of memory assigned to the virtual machine running the DDVE instance. The `requirements option displays the physical storage requirements for DDVE.`
`vserver config set`	DDVE supports the hypervisor's functionality to collect performance statistics from the hypervisor. These performance statistics can be used to troubleshoot the DDVE performance problems. To do that, users need to specify the vServer information (hostname or IP address) and the credential information(username and password). The vServer can be a vCenter server, an ESXi host for vSphere, a Hyper-V server, or an SVCMM server for Hyper-V. Once this information is configured, DDVE will collect performance statistics from the vServer every 5 minutes.
`vserver config reset`	Reset the vServer credentials for DDVE to their default values.
`vserver config show`	Display the vServer credentials for DDVE.

Modified DD OS commands

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

Table 4. Modified DD OS commands

Command	Changes
`alert`	The `tenant-unit` parameter is not supported.
`compression`	The `tenant-unit` parameter is not supported.
`config setup show`	Arguments for configuring features not available in DDVE have been removed.
`ddboost clients show active`	The `tenant-unit` parameter is not supported.
`ddboost file-replication show active`	The `tenant-unit` parameter is not supported.
`ddboost file-replication show detailed-file-history`	The `tenant-unit` parameter is not supported.
`ddboost file-replication show file-history`	The `tenant-unit` parameter is not supported.

Table 4. Modified DD OS commands (continued)

Command	Changes
`ddboost option reset`	The `fc` parameter is not supported.
`ddboost option show`	The `fc` parameter is not supported.
`ddboost storage-unit create`	The `tenant-unit` parameter is not supported.
`ddboost storage-unit modify`	The `tenant-unit` parameter is not supported.
`ddboost storage-unit show`	The `tenant-unit` parameter is not supported.
`ddboost streams show active`	The `tenant-unit` parameter is not supported.
`ddboost streams show history`	The `tenant-unit` parameter is not supported.
`disk rescan`	The `<enlcosure-ID>.<disk-ID>` parameter is not supported.
`disk show state`	DDVE system disks show the `System Dev` state.
`disk show stats`	The DDVE format for this command is `disk show stats [dev <n>]`
`disk status`	The `Spare` row has been removed from the output. The `System` row has been added.
`enclosure show all`	The `[<enclosure>]` parameter is not supported.
`enclosure show controllers`	The `[<enclosure>]` parameter is not supported.
`enclosure show cpus`	The `[<enclosure>]` parameter is not supported.
`enclosure show io-cards`	The `[<enclosure>]` parameter is not supported.
`enclosure show memory`	The `[<enclosure>]` parameter is not supported.
`filesys encryption keyes delete`	The `[tier {active | archive} | archive-unit <unit-name>]` parameter is not supported.
`filesys encryption keys show`	The `[tier {active | archive} | archive-unit <unit-name>]` parameter is not supported.
`filesys fastcopy`	The `[retention-lock]` parameter is supported with DDVE 4.0. Retention lock governance mode is supported for DDVE on premises. Retention lock compliance mode is not supported for any DDVE.
`filesys show compression`	The `[tier {active | archive} | archive-unit <unit-name>]` parameter is not supported.
`filesys show space`	The `[tier {active | archive} | archive-unit <unit-name> | arcjove-unit {all | <unit-name>]` parameter is not supported.
`mtree create`	The `tenant-unit` parameter is not supported.
`mtree list`	The `tenant-unit` parameter is not supported.
`mtree show compression`	The `tenant-unit` and `tenant-unit` parameters are not supported.
`mtree show performance`	The `tenant-unit` parameter is not supported.
`net create interface`	The `<virtual-ifname>` parameter is not supported.
`net destroy`	The `<virtual-ifname>` parameter is not supported.
`perf`	The `vtl` option is not supported on any `perf` command.
`storage add`	The `enclosure` and `disk` parameters are not supported.

Table 4. Modified DD OS commands (continued)

Command	Changes
`storage remove`	The `enclosure` and `disk` parameters are not supported.
`storage show`	The `archive` option is not supported.
`system show stats`	NVRAM statistics are not reported, because DDVE systems do not have physical NVRAM.
`quota`	The `tenant-unit` parameter is not supported.
`replication`	MTree replication is the only type of replication supported.
`snapshot`	The `tenant-unit` parameter is not supported.

Unsupported DD OS commands

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

Table 5. Unsupported commands and command options

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

Table 5. Unsupported commands and command options (continued)

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

Table 5. Unsupported commands and command options (continued)

Unsupported command or command option	Notes
`enclosure show memory [enclosure]`	This command is supported, but not with the *enclosure* argument.
`enclosure show nvram`	
`enclosure show powersupply`	
`enclosure show summary`	
`enclosure show temperature-sensors`	
`enclosure show topology`	
`enclosure test topology`	
`filesys archive`	
`filesys clean update-stats`	Deprecated. Use `filesys show space` instead.
`filesys encryption`	
`filesys encryption passphrase change`	Deprecated. Use `system passphrase change` instead.
`filesys retention-lock`	Deprecated. Use `mtree retention-lock` instead.
`filesys show compression tier`	The `tier` option is not supported.
`filesys show history`	Deprecated. Use `filesys show compression daily` instead.
`ha create`	Not supported by DDVE in cloud
`ha destroy`	Not supported by DDVE in cloud
`ha status`	Not supported by DDVE in cloud
`ha failover`	Not supported by DDVE in cloud
`ha online`	Not supported by DDVE in cloud
`ha offline`	Not supported by DDVE in cloud
`license`	The `license` commands are not supported because DDVE uses new `elicense` commands.
`mtree show compression mtree_path tier`	
`net aggregate`	
`net config ifname type cluster`	
`net create interface virtual-ifname`	
`net create interface physical-ifname vlan vlan-id`	
`net create virtual vethid`	
`net destroy virtual-ifname`	
`net destroy vlan-ifname`	
`net failover`	
`net modify virtual-ifname bonding {aggregate | failover`	
`net set portnaming`	
`ndmp`	
`ndmpd`	

Table 5. Unsupported commands and command options (continued)

Unsupported command or command option	Notes
`nfs option disable report-replica-as-writable`	Deprecated. Use `filesys option disable report-replica-as-writable` instead.
`nfs option enable report-replica-as-writable`	Deprecated. Use `filesys option enable report-replica-as-writable` instead.
`nfs option reset report-replica-as-writable`	Deprecated. Use `filesys option reset report-replica-as-writable` instead.
`nfs option show report-replica-as-writable`	Deprecated. Use `filesys option show report-replica-as-writable` instead.
`perf * module vtl`	
`san`	
`shelf migration start`	Not supported by DDVE in cloud
`shelf migration status`	Not supported by DDVE in cloud
`shelf migration suspend`	Not supported by DDVE in cloud
`shelf migration resume`	Not supported by DDVE in cloud
`shelf migration precheck`	Not supported by DDVE in cloud
`shelf migration option`	Not supported by DDVE in cloud
`shelf migration finalize`	Not supported by DDVE in cloud
`shelf migration show history`	Not supported by DDVE in cloud
`snapshot add schedule` *`name`* `[days` *`days`*`] time` *`time`* `[,`*`time`*`...] [retention` *`period`*`]`	Deprecated. Use `snapshot schedule create` instead.
`snapshot add schedule` *`name`* `[days` *`days`*`] time` *`time`* `every` *`mins`* `[retention` *`period`*`]`	Deprecated. Use `snapshot schedule create` instead.
`snapshot add schedule` *`name`* `[days` *`days`*`] time` *`time`*`-`*`time`* `[every` *`hrs`* `|` *`mins`*`] [retention` *`period`*`]`	Deprecated. Use `snapshot schedule create` instead.
`snapshot del schedule {`*`name`* `| all}`	Deprecated. Use `snapshot schedule destroy` instead.
`snapshot modify schedule` *`name`* `{[days` *`days`*`] | time` *`time`* `[,`*`time`*`...] | [retention` *`period`*`]}`	Deprecated. Use `snapshot schedule modify` instead.
`snapshot modify schedule` *`name`* `{[days` *`days`*`] | time` *`time`* `every {`*`mins`* `| none} | [retention` *`period`*`]}`	Deprecated. Use `snapshot schedule modify` instead.
`snapshot modify schedule` *`name`* `{[days` *`days`*`] | time` *`time`*`-`*`time`* `[every {`*`hrs`* `|` *`mins`* `| none}] | [retention` *`period`*`]}`	Deprecated. Use `snapshot schedule modify` instead.
`snapshot reset schedule`	Deprecated. Use `snapshot schedule reset` instead.
`snapshot show schedule`	Deprecated. Use `snapshot schedule show` instead.
`storage add enclosure` *`enclosure-id`*	
`storage add disk` *`enclosure-id.disk-id`*	
`storage remove enclosure` *`enclosure-id`*	
`storage remove disk` *`enclosure_id.disk-id`*	
`system firmware`	
`system option set console`	

Table 5. Unsupported commands and command options (continued)

Unsupported command or command option	Notes
`system retention-lock`	
`system sanitize`	
`system show anaconda`	
`system show controller-inventory`	
`system show nvram`	
`system show nvram-detailed`	
`system show oemid`	
`system upgrade continue`	
`user`	
`user change priv`	Deprecated, with no replacement.
`vserver config set host`	Not supported by DDVE in cloud
`vserver config reset`	Not supported by DDVE in cloud
`vserver config show`	Not supported by DDVE in cloud
`vserver config perf-stats start`	Not supported by DDVE in cloud
`vserver config perf-stats stop`	Not supported by DDVE in cloud
`vserver config perf-stats status`	Not supported by DDVE in cloud
`vtl lunmask`	Deprecated. Use `vtl group` instead.
`vtl lunmask add`	Deprecated. Use `vtl group add` instead.
`vtl lunmask del`	Deprecated.
`vtl lunmask show`	Deprecated. Use `vtl group show` instead.

Troubleshooting performance issues

You can check DDVE performance statistics as follows:

You can also use the following to monitor benchmark performance:

Extensions to DDOS for DDVE on page 35 provides more information about commands.

CPU Performance

The two key statistics for CPU performance are:

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

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

Memory Performance

- Memory swapping—The key statistic for memory performance, which is the current amount of guest physical memory swapped out to the virtual machine's swap file.

Virtual Disk Performance

The key statistics for virtual disk performance are:

- I/O throughput—A decrease in these values indicates a performance issue.
- I/O latency—An increase in read and write latency values indicates a performance problem.

Failed commands—An increase in the average number of outstanding read and write requests indicates a performance problem.

A

Best Practices for Working with DDVE in the Cloud

This chapter includes the following topics:

Topics:

Supportability

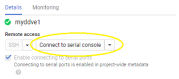
Use this procedure to connect to the serial console.

About this task

The interactive serial console is useful to debug boot and networking issues, troubleshoot malfunctioning instances, interact with the GRand Unified Bootloader (GRUB), and perform other troubleshooting tasks. GCP supports enabling interactive serial console access for an individual instance or an entire project. We recommend enabling the serial console for the DDVE.

Steps

1. Navigate to `Compute Engine>VM Instances` on the GCP web console.
2. Select your DDVE instance.
3. Click **Connect to serial console**.



4. In the console dialog box, log in using the DDVE credentials.

   NOTE: GCP Serial Console provides more information.

ASUP Configuration

Enable AutoSupport (ASUP) in DDVE to ensure that ASUPs and alert emails from your system are sent to the DD system.

Set up the following:

- Administrator: Enter a password and email address for the Administrator.
- Email/Location: Enter the mail server used to send outgoing alert and ASUPs to recipients. Recipients are subscribers to groups. A group that is named default is created with the email address of two subscribers: the administrator and autosupportalert@autosupport.datadomain.com. The location field is for your information, only.
- Summary: Review the summary carefully. The default address for alerts and autosupport emails is autosupportalert@autosupport.datadomain.com. A detailed autosupport and an alert summary are scheduled to run daily at 06:00.

Increase GCP resource quota

GCP might have a default quota setup for each region/zone for your project. To support DDVE 16 TB, 32 TB, and 96 TB requirements, increase the quota before deploying DDVE. Because only an SSD persistent disk is supported as a data disk, ensure that the SSD persistent disk meets the quota requirement. If you plan to deploy multiple DDVE instances, you might also need to increase other resource quotas, such as CPU number, IP address number, and instance number. Storage Best Practices provides more requirement details.

You can determine each resource requirement by multiplying the number of requirements by the planned instance number. GCP Resource Quotas provides more information about sending a quota increase request.

GCP Licensing

The DDVE license is node locked, which means the same license cannot be used on multiple DDVE instances. To facilitate DDVE license management, we recommend using a served-mode license for multiple DDVE instances.

NOTE:

- The DDVE license might become invalid after removing the first NIC ethV0.
- In the case of a head swap, a served-mode license continues to work on new DDVE instance. Other license types require that you re-activate the license.
- You can create a new DDVE instance from GCP snapshot. A served-mode license is automatically checked out from the license server on the new instance, as long as the license server has sufficient licenses. Other license types require that you re-activate the license.

Storage best practices

Storage type

Ensure that you use the appropriate storage type. DDVE on GCP uses the standard persistent disk (HDD) for the root disk. The NVRAM disk and all metadata disks use the SSD persistent disk.

NOTE: For GCP the hard limit of total throughput per instance is 120 MB/s. The HDD disk cannot meet this requirement.

Storage Specifications for Object Storage for DDVE on GCP

The following table shows the instance types and storage types required for the Object Store. The compression ratio in your environment might require more metadata disks.

Table 6. Storage Configuration Types for DDVE on GCP

DDVE Configuration	Instance Type	Root Disk/Size	NVRAM Disk	Metadata Disk	Number of Metadata Disks	Data Storage
16 TB	custom-4-16384	Standard persistent disk/250 GB	SSD persistent disk/10 GB	SSD persistent disk/1024 GB	1-2	Google Cloud Storage (Regional is recommended)
32 TB	custom-8-32768	Standard persistent disk/250 GB	SSD persistent disk/10 GB	SSD persistent disk/1024 GB	1-4	Google Cloud Storage (Regional is recommended)
96 TB	custom-16-65536	Standard persistent disk/250 GB	SSD persistent disk/10 GB	SSD persistent disk/1024 GB	1-10	Google Cloud Storage (Regional is recommended)

GCP Machine Types provides more details about GCP instance types.

NOTE: If DDVE in GCP uses the incorrect instance type, an incorrect virtual hardware configuration alert appears.

Storage Specifications for Block Storage for DDVE on GCP

The following table shows the instance types and storage types required for Block Storage. For DDVE with Block Storage solution, the maximum supported capacity is 16 TB.

Table 7. Storage Configuration Types for DDVE on GCP

DDVE Configuration	Instance Type	Root Disk/Size	NVRAM Disk	Data Disk
16 TB	custom-4-16384	Standard persistent disk/250 GB	SSD persistent disk/10 GB	SSD persistent disk/ 2048 GB

GCP Machine Types provides more details about GCP instance types.

NOTE: If DDVE in GCP uses the incorrect instance type, an incorrect virtual hardware configuration alert appears.

Storage Size Specifications

The compression ratio in your environment might require more metadata disks.

Table 8. Storage size specifications

Capacity Configuration	Instance Type	Storage Configuration Type		
		Root Disk	NVRAM Disk	Metadata Disk
Up to 16 TB	custom-4-16384	250 GB	10 GB	2 x 1024 GB
16 TB to 32 TB	custom-8-32768	250 GB	10 GB	4 x 1024 GB
32 TB to 96 TB	custom-16-65536	250 GB	10 GB	10 x 1024 GB

NOTE: The metadata requirements that are listed for supported virtualization platforms are based on 10X dedup ratio and 2X compression. Your system configuration may require a higher storage ratio. Expand the storage if required.

Supported Stream Count

Table 9. Supported stream count (Object Storage)

Capacity Configuration (TiB)	Instance Type	vCPUs	Memory	Stream Counts				
				Read	Write	Replication In	Replication Out	Combined
16	custom-4-16384	4	16	30	45	45	42	60
32	custom-8-32768	8	32	50	90	90	82	90
96	custom-16-65536	16	64	50	180	180	100	180

Table 10. Supported stream count (Block Storage)

Capacity Configuration (TiB)	Instance Type	vCPUs	Memory	Stream Counts				
				Read	Write	Replication In	Replication Out	Combined

Table 10. Supported stream count (Block Storage) (continued)

16	custom-4-16384	4	16	30	45	45	42	60

Metadata Disk Storage Expansion Notes

You can deploy metadata disks incrementally. The minimum incremental size is 1 TiB. Add metadata disks as required up to the supported system capacity. The following table lists the recommended number of metadata disks by instance, based on the assumption of 2X overall deduplication ratio (10X deduplication and 2X compression). For workloads with a higher deduplication ratio, additional metadata storage is required.

Table 11. Recommended metadata disks by instance

Instance	Recommended metadata disks
16 TB	2
32 TB	4
96 TB	10

When adding the volume, there is no need to specify a spindle group. The spindle group assignment is balanced automatically when storage is added. We recommend that you do not manually set or change the spindle group setting. Run `storage show all` to verify that each data volume has been assigned to a different spindle group.

Data Storage Configuration Notes for Object Storage Solution

- The bucket that is provided during file system creation must be empty, otherwise file system creation fails.
- When the file system is destroyed, the associated bucket and the objects it contains are not automatically deleted or removed. The bucket be must intentionally deleted to avoid incurred costs with the content stored in the object store.

Security best practices

Avoid public IP address

To prevent brute force attacks on the DDVE, do not configure DDVE with a public IP address.

Secure access

DDVE supports the authentication methods listed in the following table:

Table 12. Access types and authentication

Access Type	Authentication Methods
GUI	username/password X509 certificates
SSH	username/password
	SSH key pair
REST API	username/password X509 certificates

For better security, we recommend that you disable the username/password-based user authentication. If the username/password based authentication is required, configure it with a strong password.

NOTE: Do not disable password-based login if you want to configure Avamar Virtual Edition, NetWorker, or other backup software to connect to DDVE in GCP, because these products use password authentication for communication between them.

Security best practices

Because GCP is a public cloud, pay attention to the security in your deployment. We suggest these best practices:

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

When deploying DDVE from the Google cloud console, you cannot assign a password for the DDVE default user **sysadmin**, but you can assign a public key for the sysadmin.

Note the important differences between the DDVE and the standard Linux flavor in GCP:

- After deployment, the DDVE SSH user/password login is enabled. The default password is the instance ID (instanceid) of the DDVE. On first login, you must change the password.
- If you assign a public key when deploying DDVE from the Google cloud console, you can access DDVE over SSH key pair.
- For DDVE, the public key is applied only to the sysadmin user. In standard Linux, if you provide a public key with the format **`ssh-rsa [KEY_VALUE] [USERNAME]`**, and then create a USERNAME, this public key is applied only to this user.

IP Tables feature

After protecting the DDVE using secure setup, in DDVE you can filter the network traffic that enters by using the `iptables` feature. The Net Filter section of the *DD OS Command Reference Guide* provides more configuration information.

Firewall rule settings

Because the DDVE instance on GCP is always running in a VPC, configure the VPC so that only required and trusted clients have access to the DD system. The following tables show the TCP and UDP ports that are used by the DD system for inbound and outbound traffic the services that use them. Consider the following information when configuring VPC firewall rules. GCP firewall rules provides more information.

Inbound control

The following table lists the inbound ports used by DDVE.

Table 13. Inbound ports used by DDVE

Port	Service	Description
TCP 22	SSH	Used for SSH (CLI) access and for configuring DDVE.
TCP 443	HTTPS	Used for DDSM (GUI) access and for configuring DDVE.
TCP 2049	DD Boost/NFS	Main port used by NFS. You can modify using the nfs set server-port command which requires SE mode.
TCP 2051	Replication/DD Boost/ Optimized Duplication	Used only if replication is configured (run replication show config on DD system to determine). You can modify this port using replication modify.
TCP 3009	SMS (system management)	Used for managing a system remotely with DD System Manager. This port cannot be modified. This port must be open if you plan to configure replication from within the DD System Manager, as the replication partner needs to be added to the DD System Manager.

Depending on the protocol that is used to backup data to DDVE, additional ports are enabled with inbound firewall rules. Ports for inbound traffic provides a complete list of all ports enabled for inbound traffic for DD systems.

Outbound control

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

Table 14. Outboard ports used by DDVE

Port	Service	Description
UDP 123	NTP	Used by the DD system to synchronize to a time server.
TCP 443	HTTPS	Used for DDVE to communicate with outside services.
TCP 2049	DD Boost/NFS	Main port used by NFS - can be modified using the `nfs set server-port` command which requires SE mode.
TCP 2051	Replication/DD Boost/ Optimized Duplication	Used only if replication is configured (run `replication show config` on DD system to determine). This port can be modified using replication modify.
TCP 3009	SMS (system management)	Used for managing a system remotely using DD System Manager. This port cannot be modified. This port will also need to be opened if you plan to configure replication from within the DataDomain System Manager, as the replication partner needs to be added to the DD System Manager.

Depending on the other applications/services that are being used, additional ports are enabled for outbound firewall rules. For a complete list of all ports enabled for outbound traffic for DD systems, see Ports for outbound traffic table.

B

Networking Best Practices for DDVE in the Cloud

This chapter includes the following topics:

Topics:

VPC architecture

It is recommend that you use public or private subnet architecture to deploy the DDVE in a private subnet. It will secure the DDVEs (VMs) with the appropriate VPC components such as route tables, access control lists, and firewall rules.

Multiple NICs for DDVE in GCP

Follow this guidance when deploying a DDVE with multiple NICs.

- Assign multiple NICs when deploying the DDVE. GCP does not support adding additional NICs after the VM has been deployed.
- Ensure the first NIC ethV0 is not disabled
- Ensure that each NIC is in a different VPC. This is a GCP requirement.

Default DHCP configuration

Dynamic Host Configuration Protocol (DHCP) is enabled by default for up to two interfaces in the DDVE. If there are additional interfaces, DHCP can be manually enabled or those interfaces can be configured manually. All the interfaces in DDVE can be configured manually using static IP addresses. However, ensure that the IP addresses are known to the corresponding network interfaces in GCP.

Ports for inbound traffic

The following are the ports that are used by the DD system for inbound traffic.

Table 15. Ports Used by DD System for Inbound Traffic

Port	Service	Note
TCP 21	FTP	Port is used for control only if FTP is enabled (run 'adminaccess show' on the DD system to determine if this is the case).
TCP 22	SSH	Port is used only if SSH is enabled (run 'adminaccess show' on the DD system to determine if this is the case).
TCP 23	Telnet	Port is used only if Telnet is enabled (run 'adminaccess show' on the DD system to determine if this is the case).

Table 15. Ports Used by DD System for Inbound Traffic (continued)

Port	Service	Note
TCP 80	HTTP	Port is used only if HTTP is enabled (run 'adminaccess show' on the DD system to determine if this is the case).
TCP 111	DDBOOST/ NFS (portmapper)	Used to assign a random port for the mountd service used by NFS and DDBOOST. `Mountd service port` can be statically assigned.
UDP111	DDBOOST/ NFS (portmapper)	Used to assign a random port for the mountd service used by NFS and DDBOOST. `Mountd service port` can be statically assigned.
UDP 123	NTP	Port is used only if NTP is enabled on the DD system. Run `ntp status` to determine if this is the case.
UDP 137	CIFS (NetBIOS Name Service)	Port used by CIFS for NetBIOS name resolution.
UDP 138	CIFS (NetBIOS Datagram Service)	Port used by CIFS for NetBIOS Datagram Service.
TCP 139	CIFS (NetBIOS Session Service)	Port used by CIFS for session information.
UDP 161	SNMP (Query)	Port is used only if SNMP is enabled. Run 'snmp status' to determine if this is the case.
TCP 389	LDAP	LDAP server listens on this port for any LDAP client request. By Default it uses TCP.
TCP 443	HTTPS	Port is used only if HTTPS is enabled (run `adminaccess show` on the DD system to determine if this is the case).
TCP 445	CIFS (Microsoft-DS)	Main port used by CIFS for data transfer.
TCP 2049	DD Boost / NFS	Main port used by NFS. Can be modified via the 'nfs set server-port' command. Command requires SE mode.
TCP 2051	Replication / DD Boost / Optimized Duplication	Port is used only if replication is configured on the DD system. Run `replication show config` to determine if this is the case. This port can be modified via the `replication modify` command.
TCP 2052	NFS Mountd / DD BOOST / Optimized Duplication	Main port used by NFS MOUNTD
TCP 3009	SMS (System Management)	Port is used for managing a system remotely using Web Based GUI DD EM (DD Enterprise Manager). This port cannot be modified. This port is only used on DD systems running DD OS 4.7.x or later. This port will also need to be opened if you plan to configure replication from within the DD GUI interface, as the replication partner needs to be added to the DD Enterprise Manager.
TCP 5001	iPerf	Port is default used by `iperf`. To change the port, it requires -p option from `se iperf` or port option from the `net iperf` command. The remote side must listen on the new port.
TCP 5002	Congestion-checker	Port is default used by `congestion-checker`, when it runs `iperf`. To change the port the new port needs to be specified in the port option of the `net congestion-check` command. The remote side must also be listen on the new port. It is available only for DD OS 5.2 and above.

Ports for outbound traffic

The following are the ports that are used by the DD system for outbound traffic.

Table 16. Ports Used by DD System for Outbound Traffic

Port	Service	Note
TCP 20	FTP	Port is used for data only if FTP is enabled (run `adminaccess show` on the DD system to determine if this is the case).
TCP 25	SMTP	Used by the DD system to send email autosupports and alerts.
UDP/TCP 53	DNS	Port is used by DD system to perform DNS lookups when DNS is configured. Run `net show dns` to review DNS configuration.
TCP 80	HTTP	Used by DD system for uploading log files to DD Support via the `support upload` command.
UDP 123	NTP	Used by the DD system to synchronize to a time server.
UDP 162	SNMP (Trap)	Used by the DD system to send SNMP traps to SNMP host. Use `snmp show trap-hosts` to see destination hosts and `snmp status` to display service status.
TCP 443	HTTPS	Port is used for communicating with Object store (S3).
UDP 514	Syslog	Used by the DD system to send syslog messages, if enabled. Use 'log host show' to display destination hosts and service status.
TCP 2051	Replication / OST / Optimized Duplication	Used by DD system only if replication is configured. Use `replication show config` to determine if this is the case.
TCP 3009	SMS (System Management)	Port is used for managing a system remotely using Web Based GUI DD EM (DD Enterprise Manager). This port cannot be modified. This port is only used on DD systems running DD OS 4.7.x or later. This port will also need to be opened if you plan to configure replication from within the DD GUI interface, as the replication partner needs to be added to the DD Enterprise Manager.
TCP 5001	iPerf	Port is default used by iperf.To change the port, it requires -p option from `se iperf` or `port` option from the `net iperf` command. And the remote side must listen on the new port.
TCP 5002	Congestion-checker	Port is default used by congestion-checker, when it runs iperf. To change the port the new port needs to be specified in the port option of the `net congestion-check` command. The remote side must also be able to listen on the new port. It is available only for DD OS 5.2 and above.
TCP 27000	Avamar client communications with Avamar server	Avamar client network hosts.
TCP 27000	Avamar server communications with Replicator target server (Avamar proprietary communication)	Required if server is used as replicator source.
TCP 28001	Avamar client communications with administrator server	Avamar clients required.
TCP 28002	Administrator server communications with Avamar client	Optional for browsing clients and cancelling backups from Avamar administrator management console.
TCP 29000	Avamar client Secure Sockets Layer (SSL) communications with Avamar server	Avamar clients required.
TCP 29000	Avamar server SSL communications with Replicator target server	Required if server is replicator source.

C

Installing and Configuring DDVE on Block Storage in the Cloud

This chapter includes the following topics:

Topics:

Deploying DDVE on Google Cloud Platform Block storage

You can deploy DDVE on GCP block storage using the GCP console or by using a shell script.

Ensure that your system meets the requirements in the following table:

Table 17. GCP System Requirements

Instance type	
CPU	4 cores
Memory	16 GiB
System Disk	Boot disk: 250 GB Standard persistent disk
	NVRAM disk: 10 GB SSD persistent disk
Storage Capacity	16 TB

Creating a DDVE instance using a deployment script

The DDVE for Google Cloud Platform (GCP) package contains the DDVE root disk zip file and deployment scripts for Linux and Windows.

Prerequisites

Install and configure Google Cloud SDK on your PC before deployment.

- Before running the deployment script, create your own project, virtual network (VPC), and subnet. Verify that the VPC and subnet are available in your zone.
- To install Google Cloud SDK on Linux, refer to Quickstart for Linux.
- To install Google Cloud SDK on Windows, refer to Quickstart for Windows.
- Configure Google Cloud SDK with your setup for project, zone, and so forth.

About this task

The following steps describe how to create DDVE from a Linux shell script. The Windows Powershell script uses the same options. Replace the sample values with values appropriate to your environment.

NOTE:

- The `-C 16TB` parameter is optional. 16 TB is the only supported configuration.

- In the second deployment command, `<dir>` is the path to the zip file `ddve-gcp.tar.gz` that was unzipped from the DDVE for GCP image package. You can use either the absolute path or the relative path.
- In the second deployment command, `mybucket` is the GCP bucket where the `ddve-gcp.tar.gz` file will be uploaded. If you do not specify the bucket, all the `xx.tar.gz` files will upload to the `ddve-gcp-bucket` by default.
- You can manually create a DDVE image from a local `ddve-gcp.tar.gz` using the following commands:

```
$ gsutil cp ddve-gcp.tar.gz gs://mybucket/
$ gcloud compute images create myimage --source-uri gs://mybucket/ddve-gcp.tar.gz
```

Steps

1. Download the DDVE image package from the Online Support site and extract the contents.
   The package contains the DDVE root disk file and the following deployment scripts: `gcp-deploy-linux.sh` for Linux shell and `gcp-deploy-windows.ps1` for Windows Powershell.
2. Do one of the following:
   - If you have already created a DDVE image in your project in GCP, create a DDVE instance with the following parameters:

```
$ ./gcp-deploy-linux.sh -n myddve0 -i myimage -z myzone -v myvpc
-s mysubnet -p myproject <-c 16TB>
Google Cloud SDK 195.0.0
bq 2.0.30
core 2018.03.23
gsutil 4.29

Starting deployment ...
Creating disk. It may take some time ...
Succeed.
Creating DDVE ...
Succeed.

Summary:
========================================
   DDVE name: myddve0
         cpu: 4 cores
      memory: 16 GB
    capacity: 16TB
   image name: myimage
      project: myproject
         zone: myzone
     vpc name: myvpc
 subnets name: mysubnet
   private IP: 10.10.9.14
========================================
```

   - If the image does not exist in GCP, run the appropriate script with the following parameters to automatically create an image and the DDVE instance.

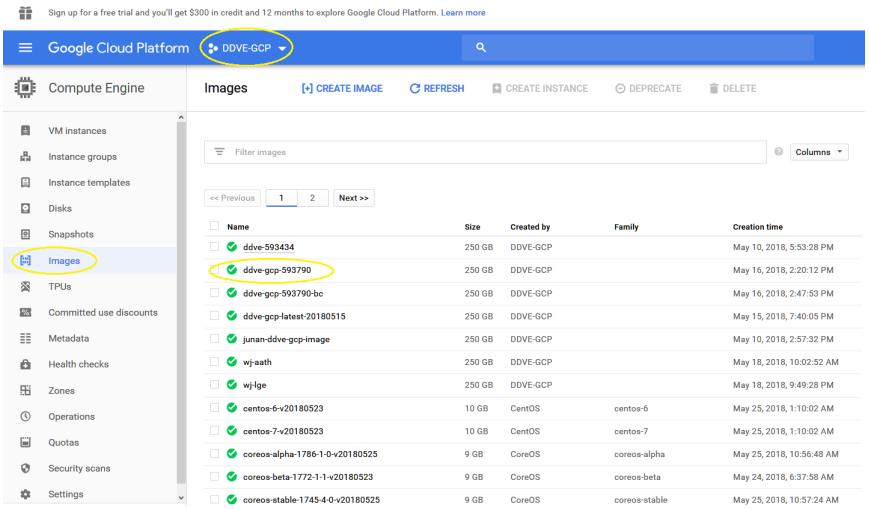
```
$ ./gcp-deploy-linux.sh -n myddve0 -f <dir>/ddve-gcp.tar.gz
-b mybucket -z myzone -v myvpc -s mysubnet -p myproject <-c 16TB>
```

Creating a DDVE instance from the GCP console

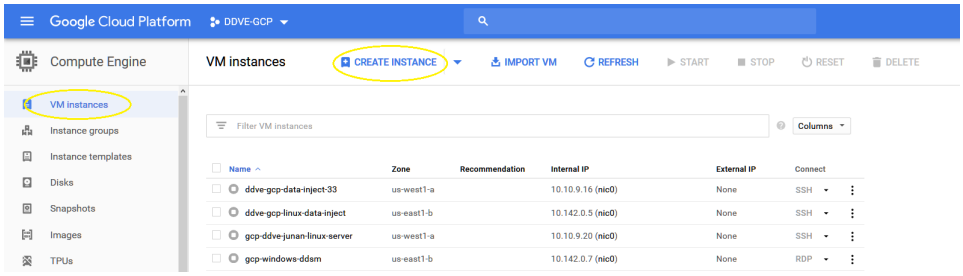
If you have already created a DDVE image, you can deploy DDVE from the Google Cloud Console (GCP).

Steps

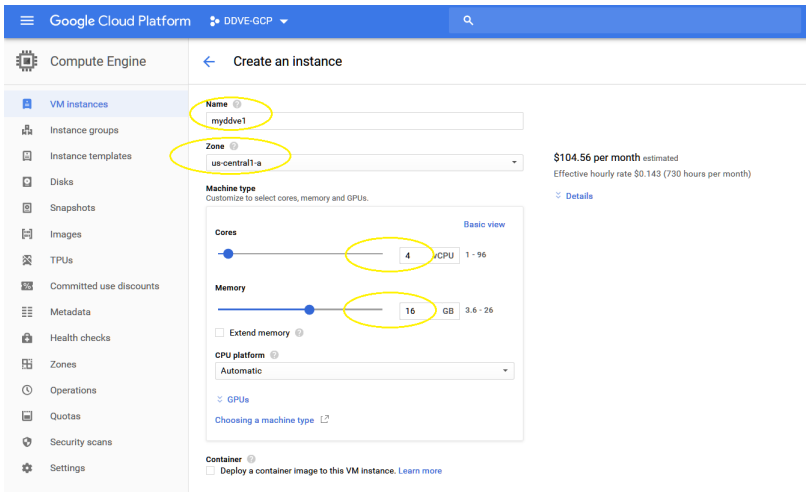
1. Login to GCP console at https://console.cloud.google.com and verify the values for the project, VPC, subnet, and DDVE image.



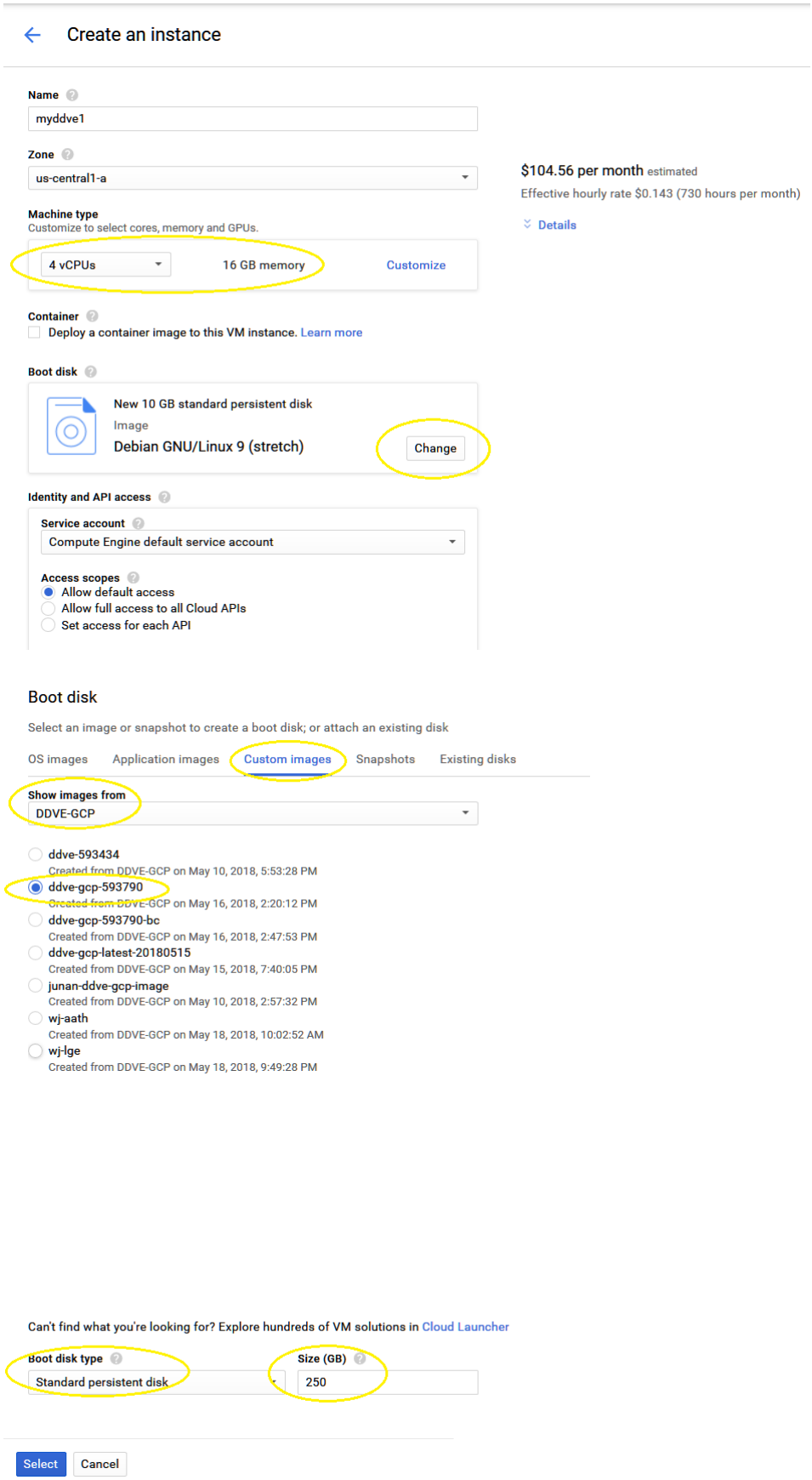
2. Create the DDVE instance from the image:
   a. Click **CREATE INSTANCE** to launch virtual machine creation.



   b. Specify the virtual machine name, select the zone where the VPC and subnet are created, and customize the CPU to 4 cores and memory to 16 GB.



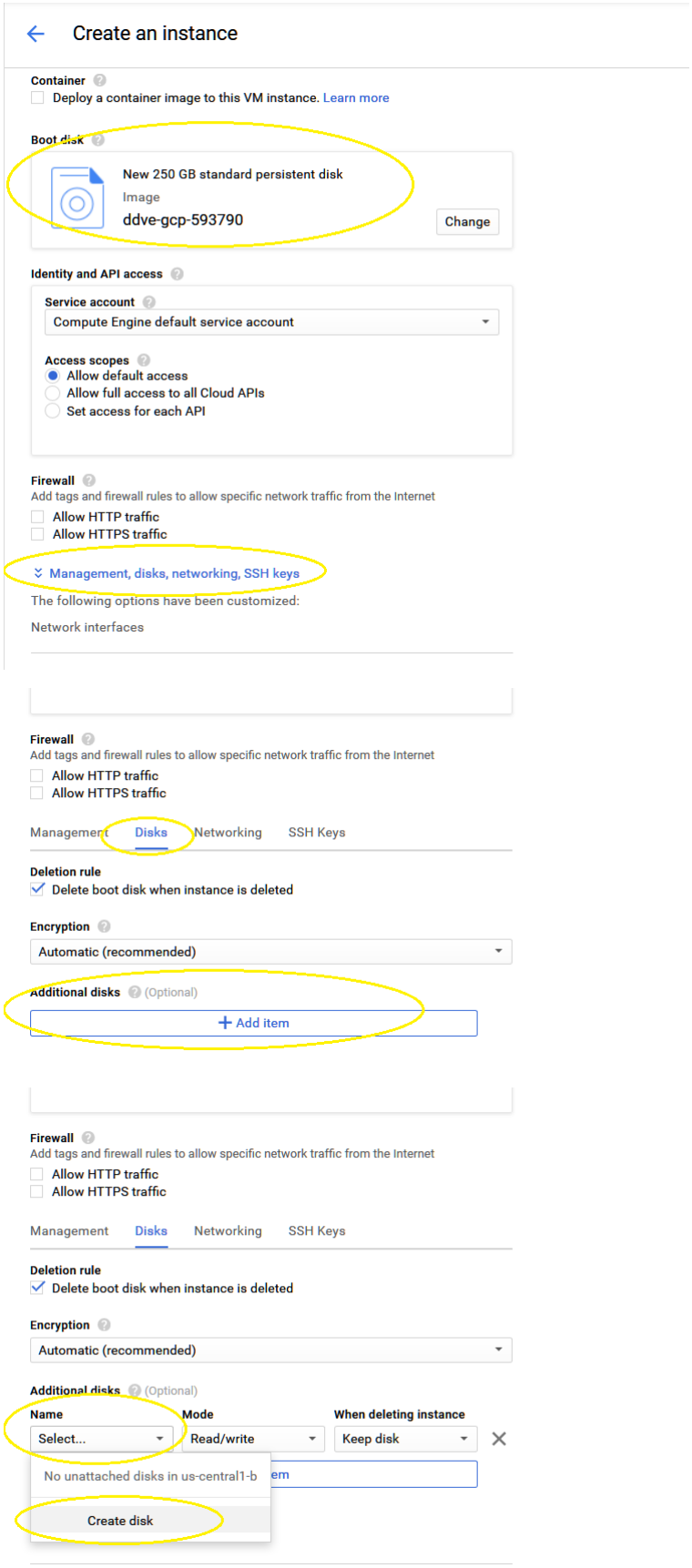
   c. Click **Change** and select the DDVE image as the boot disk. Verify that the disk type is **Standard Persistent Disk** and the size is 250 GB.

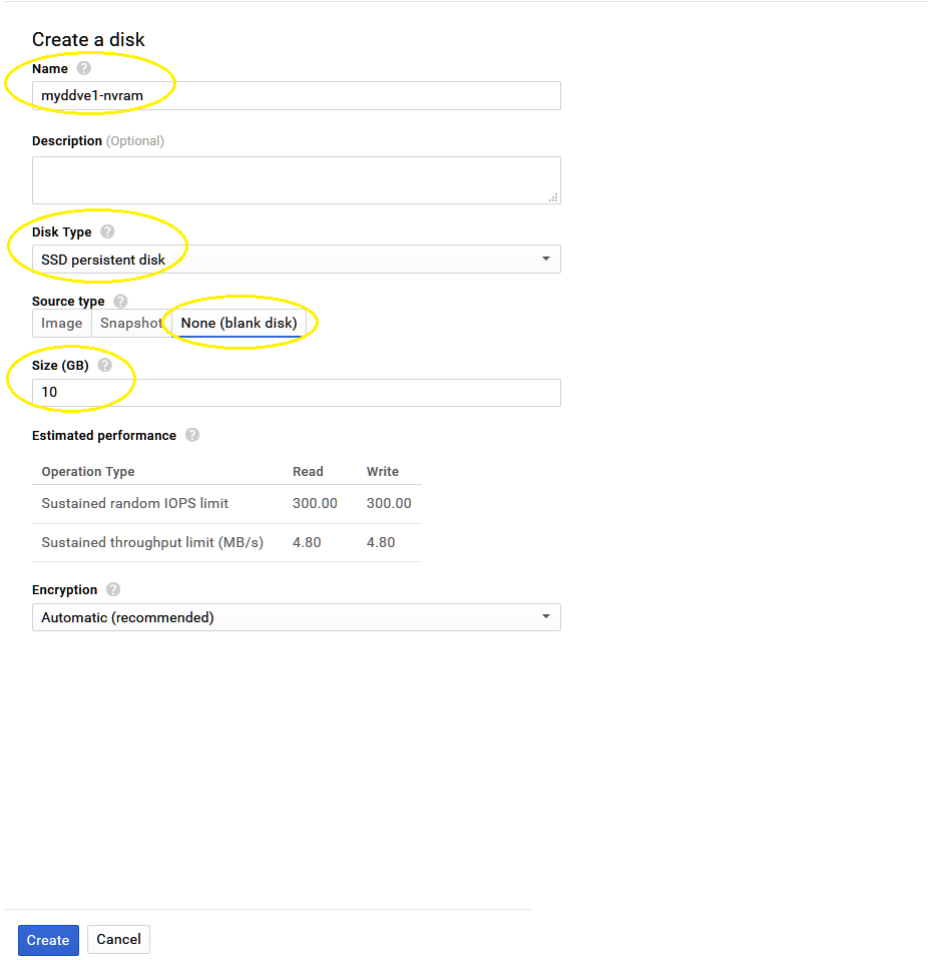


d. Select **Management, disks, networking, SSH keys** > **Disks** > **Add item** to create the NVRAM disk. From the disk name list, select **Create disk**. Specify the NVRAM disk name, and set the following parameters:

- Disk type—SSD persistent disk

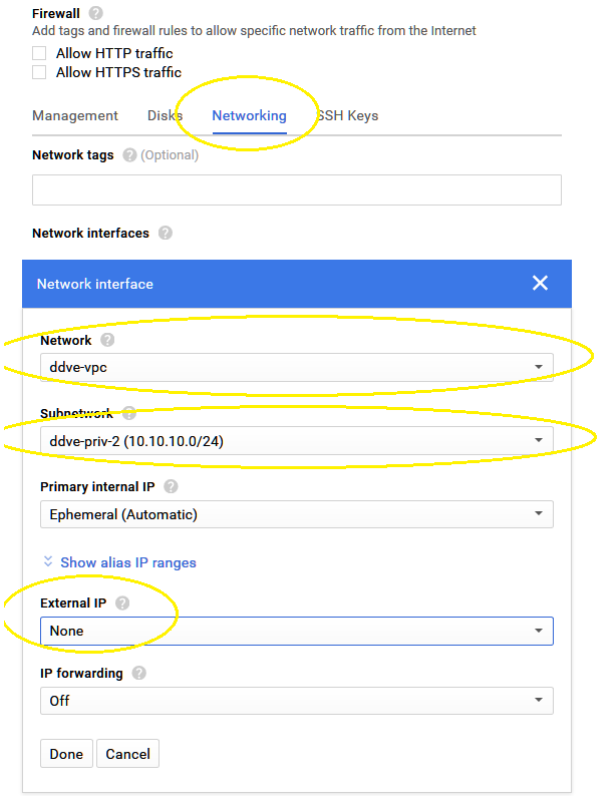
- Source type—None (blank disk)
- Disk size—10 GB



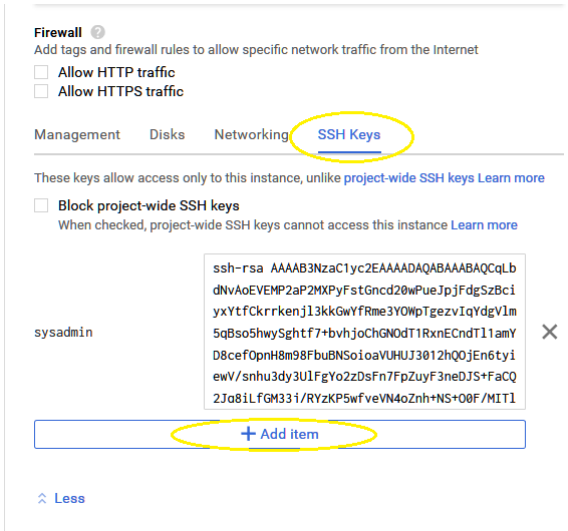


e. From the **Networking** tab, set the following parameters:

- Network—Select your VPC
- Subnetwork—Your subnet
- External IP—If you have already setup your own jump box in this subnet and want to access the DDVE only through the jump box, select **None**.

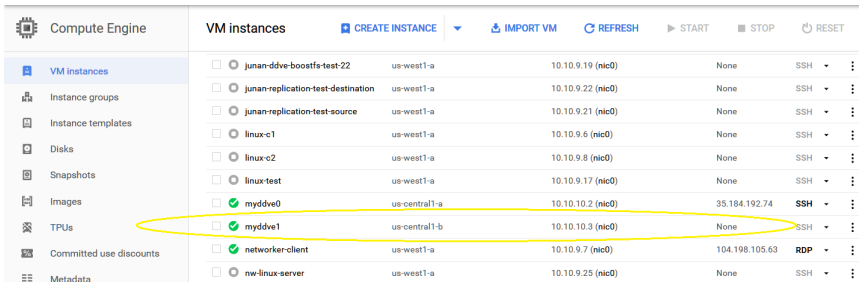


f. Optional: Assign an SSH key for the sysadmin user.



To add more SSH keys to DDVE, click **Add item**. The SSH key is only for the sysadmin user.

g. Deploy DDVE.



Results

The DDVE instance appears.

Enabling or updating SSH keys after deployment

DDVE supports assigning SSH keys during deployment from the Google Cloud console, but you cannot use the Google Cloud console to update SSH keys after deployment. DDVE adds both project-wide and instance-level SSH keys only during the first boot. Use this procedure to enable or update SSH keys.

Steps

1. Generate SSH key pairs in any Linux client if you do not have SSH keys ready.

```
$ ssh-keygen -t rsa
Generating public/private rsa key pair.
Enter file in which to save the key (/home/yourusername/.ssh/id_rsa):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/ yourusername /.ssh/id_rsa.
Your public key has been saved in /home/ yourusername /.ssh/id_rsa.pub.
The key fingerprint is:
SHA256:QcPMwxTVRMpDZ3SrnmZKm4mLpmdhmSHAt4hpjTf6FD4  yourusername@yourlinuxclient
The key's randomart image is:
+---[RSA 2048]----+
| .     *=oo=* .  |
|  o .  .*+ +.. . |
| oo+ .  ..+   .  |
|oo.=o .  . . .   |
|. + o. +S   .    |
| . E  =    . .   |
|  o .. .  . =    |
|   .  +. o B     |
|    .=. o.=      |
+----[SHA256]-----+
```

Default options create a pair of SSH keys in the `$HOME/.ssh/` directory. The private key file is `id_rsa`, and the public key file is `id_rsa.pub`.

2. Run the following command to add the public key content to DDVE: `adminaccess add ssh-keys user sysadmin`

```
sysadmin@myddve1# adminaccess add ssh-keys user sysadmin
Enter the key and then press Control-D, or press Control-C to cancel.
ssh-rsa
AAAAB3NzaC1yc2EAAAADAQABAAABAQCyYNyPI1QjpmWbDjbTqkqe7qi3wc97K5JpygX9EeLNEY3VQqzAJsfHwv
xkPnyOqKiYXOV3johwQKiZct2/1MUEpd8MvMCaDhlzyf7OrJ7DNgI5P8Ilh/dhCxe6W0crlWcG6UE
+ldHzbRrphhMzdt2CNJ3nh/gLGMpQGASHtCJZrXzUHCqu/
vivfdm6Zy2bbsNYeCdbJ6MJwaQ2FnKUhGAyeDi7SdsXb+kizokL6J5dJHKDhIJY2lNfF5jclpkoM694wvfSupe
+Zz4tx7EVlxDi2BtLrwRSiRWtTIsXYGiyz2Wx3AWzxPGSkLLqBEk0AacWsGba4hElLiAa31NZI5mt
SSH key accepted.
```

NOTE:

- You can disable some key pair access by deleting the corresponding key from DDVE with the following command: `adminaccess del ssh-keys <lineno> user sysadmin`.
- You can list keys and get the `<lineno>` by running the following command: `adminaccess show ssh-keys user sysadmin`.

```
sysadmin@<DDVE-name># adminaccess show ssh-keys user sysadmin

User "sysadmin" :
 1 ecdsa-sha2-nistp256
AAAAE2VjZHNhLXNoYTItbmlzdHAyNTYAAAAIbmlzdHAyNTYAAABBBGKQpC6UL9B4Nd5yGj4GsdKbdPnBTc1D7h
sY1GXZ/WeZzdDZDDRUplKaKV8dLJLJ/S9fOpxA3FlroLQxha77cy8= google-ssh
{"userName":"cloudboost
.blr@gmail.com","expireOn":"2018-08-28T09:07:10+0000"}
```

```
 2 ecdsa-sha2-nistp256 AAAAE2VjZHNhLXNoYTItbmlzdHAyNTYAAAAIbmlzdHAyNTYAAABBBPfRza
+rT93vmT9XqMRHWjpjInAxG3HzX0g4pGzY5J5vu1VmLNKYodmESCXxuSjKD8hJko+6emdnVl2OlzFIv5k=
google-ssh {"userName":"cloudboost
.blr@gmail.com","expireOn":"2018-08-28T09:06:51+0000"}

 3 ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAABAGt7Gbl1IR70bO/
Yj9RD8iOLbhhTuvXTJPf62lbZk6GUFLLbVzYgg7fgMm+YOAqNiiNpx
+fC26zkwKNRHl6o1HG3xHj6tOviG6Y8EVM8pXOvkI4n0beMkk8MhohkoiFO7YZECcfqysVdjcQf4CEl8ivs4bO
Tco6
qAG11cYzG2Xg8wDchwgAklI2+TPzk8oGpfBoDkrEbUN5lQshWy5i0k50eLcMVPoiAwJEfsenD1X6k9xC3qeBRs
+ck6gPUmyIJXfjAU2gdfQDcwIrEIzLjKS7nChrJ
+705EkFX3IhbaStosTS9WmrxhDZUBMQejXXk9DSqyj7kn5u2VPP9eDRwGlc= google-ssh {
"userName":"cloudboost.blr@gmail.com","expireOn":"2018-08-28T09:06:50+0000"}

 4 ecdsa-sha2-nistp256
AAAAE2VjZHNhLXNoYTItbmlzdHAyNTYAAAAIbmlzdHAyNTYAAABBBCQ1HwgGdLjpHZ7XZYEfq2nV2YFBJxecoF
MVjewDhLSKW6XG1jmySpgsyZNmze/NcXwcZmzxN6Rxkj5ObQ3nBOo= google-ssh
{"userName":"cloudboost
.blr@gmail.com","expireOn":"2018-08-28T09:06:46+0000"}

 5 ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAABAQCBkkwQaZpErCrAuuaDI1MysqnC
+xBM9LVGJaFriEmvcwoXG8/8k66r+Y6t1Qw/JWJVSCA15+MNdD9uDGqFaLve3CdOwVIiYXT3CH0YR6V
+cIZjQ2iLVXKoFT1Ch3XVAG6N88h8VuhiM/6mPm/sGC3Jhrl4pkC
wUCD3xTywGt2SCMbumXtNs/QCOX50rog6/i7iyyyQ2SAWT1C3cXo5ImC5S/
TophAma532J9dPZl0kGoFYubh2h9D9zPdQJr8VkjFiBRazH4pp6yIZoNy3xgjmz5RJPYITurOK9hPyiHWMtj0l
Zyrbviq4a57KYfSWcbAd1eIGyqdlwooP/OYPLNRD google-ssh {
"userName":"cloudboost.blr@gmail.com","expireOn":"2018-08-28T09:06:45+0000"}
```

3. Run the following command to disable password login for additional security: `adminaccess option set password-auth disabled`

```
sysadmin@myddve1# adminaccess option set password-auth disabled
**   Disabling password based authentication will disallow users to login using
password.
     Ensure users have other login option(s) configured to access the system.
        Do you want to continue? (yes|no) [no]: yes

**   Import CA certificate for "login-auth" application to enable GUI/Web-services
access.
Adminaccess option "password-auth" set to "disabled".
```

Adding NICs for DDVE

By default, DDVE is provisioned with one NIC for Google Cloud Platform. You cannot add more NICs to existing virtual machines, but you can create a DDVE with multiple NICs when you deploy the DDVE instance.

Steps

1. Configure each NIC with a different VPC. Creating Instances with Multiple Network Interfaces provides additional information.
2. Add additional NIC cards.

   For a customized instance type, you can add one NIC per vCPU, up to a maximum of 8 NIC cards.

Adding disks for DDVE from the GCP Console

Prerequisites

- Verify that sufficient licensed capacity is available to add capacity to the DDVE instance.
- Ensure that the DDVE instance can support the new capacity. DDVE in GCP supports up to 16 TB.

About this task

Although GCP provides four types of disk storage, DDVE supports only the following:

- Standard persistent disk—for the root disk
- SSD persistent disk—for NVRAM disk and data disks

  NOTE: An NVRAM disk is not required when deploying from the DDVE script, but you must create an NVRAM disk when deploying DDVE from the Google Cloud console.

New storage for the DDVE must meet the following requirements:

- The minimum size of the first data disk is 477 GiB (512 GB). We recommend 2 TB.
- The recommended size for any subsequent data disks is 2 TB.

Steps

- Create the NVRAM disk provides instructions to add a data disk to DDVE.

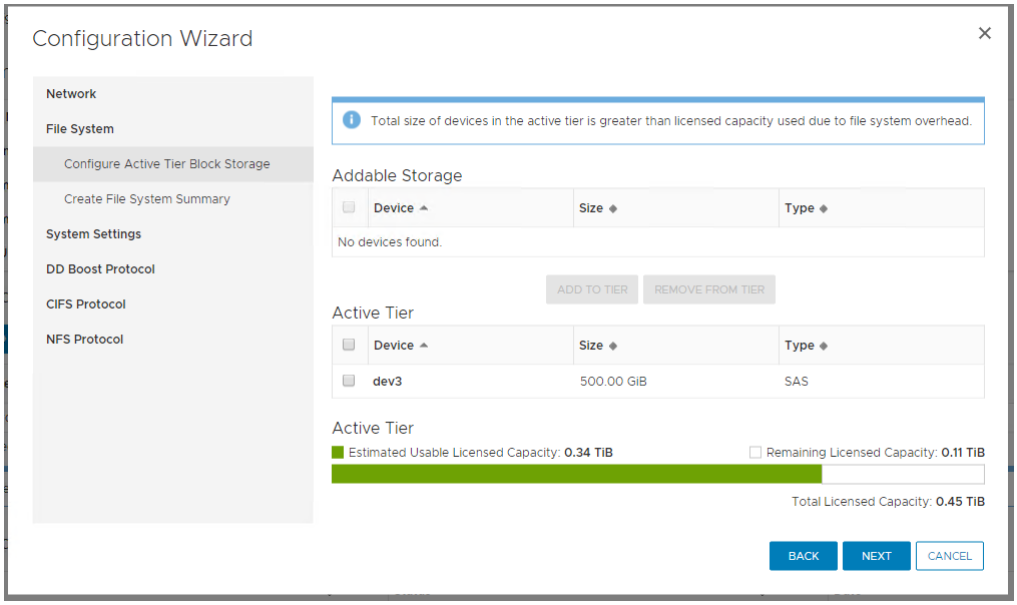
Configuring DDVE block storage on the Google Cloud Platform

You can configure block storage using the DDSM interface or the CLI interface.

Configuring DDVE block storage in GCP using the DDSM interface

Steps

1. Login to **DD System Manager** using the DDVE IP address. The default login credentials for the DDVE instance are **`sysadmin/changeme`**.
2. Add licenses. Select from the following licenses to apply:
   - Pre-installed Evaluation License
   - License file
   - License Server (if license server is available)
3. Accept the **End User License Agreement**.
4. Complete the configuration wizard, as follows:
   a. For **Network Settings** accept the default settings, and click **No** to move to the **File System** settings.
   b. Click **Yes** to configure the **File System** settings.
   c. For Storage type, select **Block Storage**.
   d. Click **Add to Tier**, verify the disk is shown in the Active Tier, and click **Next**.



   e. Review the summary and click **Submit** to create and enable the file system.

The DDVE configuration is complete. To view space usage and availability details for the Active Tier, select **Data Management** > **File System**.

Configuring DDVE block storage in GCP using CLI

You can configure DDVE block storage in GCP using the Command Line Interface (CLI) on Google Cloud Platform.

About this task

If you assigned an SSH key for the default user sysadmin when you deployed DDVE from the Google Cloud console, login to DDVE using either a key pair or a password.

Steps

1. Log in to the DDVE instance to configure the system. The default login credentials for the DDVE instance are sysadmin/changeme.

```
# ssh sysadmin@<IP address of DDVE>
EMC DD Virtual Edition
Password:
Welcome to DD OS 6.2.0.10-xyz
-----------------------------------------
sysadmin@myddve0#
```

2. During the first login, you are prompted to accept the EULA and change the password.
   The configuration wizard is launched.
3. Follow the steps in the wizard to add the **elicense**.

```
Do you want to configure system using GUI wizard (yes|no) [no]:

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

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

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


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

Pending eLicense Settings
Existing Licenses:
        Capacity licenses:
        ##   Feature    Capacity   Type                   State    Expiration Date
Note
        --   --------   --------   --------------------   ------   ---------------
----
        1    CAPACITY   0.45 TiB   unexpired evaluation   active   n/a
        --   --------   --------   --------------------   ------   ---------------
----

        Feature licenses:
        ##   Feature                      Count   Type                   State
Expiration Date   Note
        --   -------------------------   -----   --------------------   ------
---------------   ----
        1    REPLICATION                      1   unexpired evaluation   active   n/a
        2    DDBOOST                          1   unexpired evaluation   active   n/a
        3    RETENTION-LOCK-GOVERNANCE        1   unexpired evaluation   active   n/a
        4    ENCRYPTION                       1   unexpired evaluation   active   n/a
        --   -------------------------   -----   --------------------   ------
```

```
---------------   ----

New Licenses:
        Capacity licenses:
        ##   Feature    Capacity    Type               State    Expiration Date   Note
        --   --------   ---------   ---------------    ------   ---------------   ----
        1    CAPACITY   87.31 TiB   permanent (int)    active   n/a
        --   --------   ---------   ---------------    ------   ---------------   ----


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

Successfully updated eLicenses.

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

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

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

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

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

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

Configuration complete.
```

4. Run the following command to add storage: `# storage add tier active dev3`

```
sysadmin@myddve1# disk show state
Dev   1  2  3
---   ---------
1-3   Y  Y  U
---   ---------

Legend   State            Count
------   --------------   -----
U        Unknown Device   1
Y        System Device    2
------   --------------   -----
Total 0 disks and 3 devs


sysadmin@myddve1# storage add tier active dev3

Object-store is not enabled. Filesystem will use block storage for user data.
        Do you want to continue? (yes|no) [no]: yes

Checking storage requirements...done
Adding dev3 to the active tier...done

Updating system information...done

dev3 successfully added to the active tier.
```

5. Run the following command to add multiple storage devices at the same time.

```
# storage add tier active dev4-6

Checking storage requirements...done
Adding dev4 to the active tier...done

Updating system information...done
```

```
dev4 successfully added to the active tier.


Checking storage requirements...
done
Adding dev5 to the active tier...done

Updating system information...done

dev5 successfully added to the active tier.

Checking storage requirements...
done
Adding dev6 to the active tier...done

Updating system information...done

dev6 successfully added to the active tier.
```

6. Run the following command to view the attached disks. `# storage show all`

```
sysadmin@myddve1# storage show all
Active tier details:
Device        Device   Device
Group                  Size
-----------   ------   -------
(available)   3        1.0 TiB
-----------   ------   -------

Spindle   Devices   Count   Total Size
Group
-------   -------   -----   ----------
1         3         1       1.0 TiB
-------   -------   -----   ----------

Current active tier size: 1.0 TiB
Active tier maximum capacity: 16.0 TiB



Capacity License:
License    Total       Used       Remaining
--------   ---------   --------   ---------
CAPACITY   14.55 TiB   0.90 TiB   13.65 TiB
--------   ---------   --------   ---------
```

7. Run the following command to create the file system. `#filesys create`

```
sysadmin@myddve1# filesys create
A filesystem of approximate size 846.65 GiB will be created.
        Do you want to continue? (yes|no) [yes]: yes

ok, continuing.

This will take 5 - 10 minutes.

Provisioning storage...
########################################### [100%]

Initializing filesystem...
########################################### [100%]

snapshot schedules deleted

You now have a freshly initialized filesystem.
 Enable the filesystem using 'filesys enable'.
```

8. Run the following command to enable the file system `# filesys enable`

```
sysadmin@myddve1# filesys enable
Please wait..............................
The filesystem is now enabled.
```

NOTE: If the license file cannot be found in `/ddr/var` its content can be pasted in the console.

```
# elicense update license.lic
Existing licenses:

No licenses found.

New licenses:

Capacity licenses:
##    Feature     Capacity     Type               State     Expiration Date    Note
--    --------    ---------    ---------------    ------    ---------------    ----
1     CAPACITY    87.31 TiB    permanent (int)    active    n/a
--    --------    ---------    ---------------    ------    ---------------    ----


        ** New license(s) will overwrite all existing license(s).

        Do you want to proceed? (yes|no) [yes]: yes


eLicense(s) updated.
```

Results

The DDVE configuration is complete.

To manually add an elicense or to update an elicense after the initial configuration, place the license file in the folder, `/ddr/var/license.lic`, and then run the command `elicense update license.lic`.

System Headswap for DDVE block storage in GCP

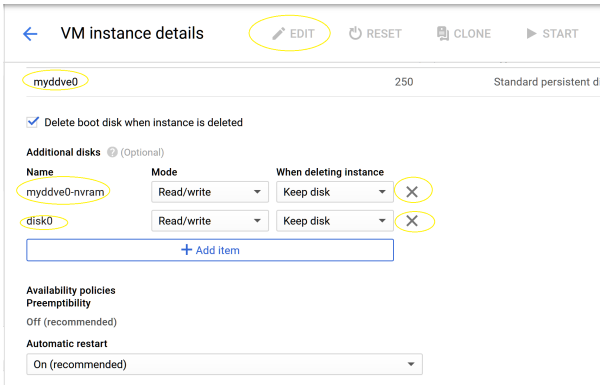
A system headswap recovers a DDVE instance from a head unit failure. The head unit refers to the DDVE root disk.

About this task

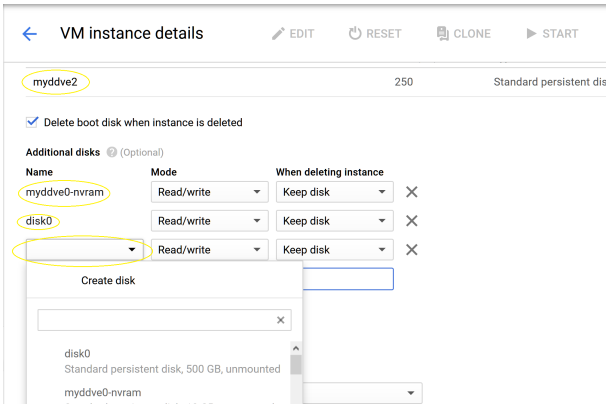
NOTE: The failed instance is referred to as instance A. The new instance is instance B.

Steps

1. Create instance B with the same instance type and DD OS build. Do not create an NVRAM disk for the new instance.
2. Detach the NVRAM and data disks from the failed head unit (instance A).



3. If instance B was deployed with an NVRAM disk, detach the NVRAM disk, then attach the NVRAM and data disks from instance A to instance B with the same order. Save the configuration of instance B.



4. Run the system headswap command on instance B.

NOTE: The system restarts during the headswap process.

```
# system headswap

This command returns the system back to its prior operational
conditions. The system will be rebooted before
resuming normal operations.

**    If system passphrase was set on the old head, you will
      need to do one of the following after headswap completes:
      - unlock the filesystem          if you have encrypted data, or
      - set the system passphrase      if you don't have encrypted data

         Are you sure? (yes|no) [no]: yes

ok, proceeding.

Please enter sysadmin password to confirm 'system headswap':
Restoring the system configuration, do not power off / interrupt process ...

#
Broadcast message from root (Fri May 25 07:12:35 2018):
The system is going down for reboot NOW!
```

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

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