

Configuring a Google Cloud Virtual Machine as Global-Active Device Quorum

Implementation Guide

Hitachi Vantara

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Global-Active Device Quorum on Google Cloud Platform

About This Guide

This guide provides instructions for deploying a virtual machine in Google Cloud and configuring it as an iSCSI target. We will use the Linux package “targetcli” to create and manage block devices on the virtual machine. The objective is to leverage volumes from the iSCSI target virtual machine running on Google Cloud as quorum volumes for Global-active device (GAD).

Intended Audience

This document is intended for Hitachi Vantara and Hitachi partner representatives who need a foundation of knowledge on this product to best represent it to potential buyers.

Document Revisions

Revision Number	Date	Details
1.0	May 2022	Initial release.

References

- [Hitachi Global-Active Device User Guide](#)
- [Linux SCSI Target: Targetcli](#)

Contributors

The information included in this document represents the expertise, feedback, and suggestions of a number of skilled practitioners. The author (Kevin Tang) wants to recognize and thank the following contributors and reviewers of this document (listed alphabetically by last name):

- Tom Attanese - Product Management
- Paul Romero - Global Product & Solutions Enablement

Comments

Please send your comments on this document to gpse.replicationsoftware@hitachivantara.com. Include the document title and number, including the revision level, and refer to specific sections and paragraphs whenever possible. All comments become the property of Hitachi Vantara.

Thank You!

Configuration and Specifications

Introduction

This guide provides instructions for deploying a virtual machine in Google Cloud and configuring it as an iSCSI target. We will use the Linux package “targetcli” to create and manage block devices on the virtual machine. The objective is to leverage volumes from the iSCSI target virtual machine running in Google Cloud as quorum volumes for Global-active device (GAD).



Only use volumes from an iSCSI target virtual machine for global-active device quorums. Do not use them as data volumes.



This guide does not include instructions for establishing a VPN connection to Google Cloud documentation, such as <https://cloud.google.com/network-connectivity/docs/vpn/how-to/adding-a-tunnel>.

Figure 1 illustrates the test environment. The on-premises datacenter is connected to Google Cloud using a VPN tunnel. Network traffic is passed between the on-premises storage systems and the iSCSI target virtual machine in Google Cloud using the VPN tunnel.

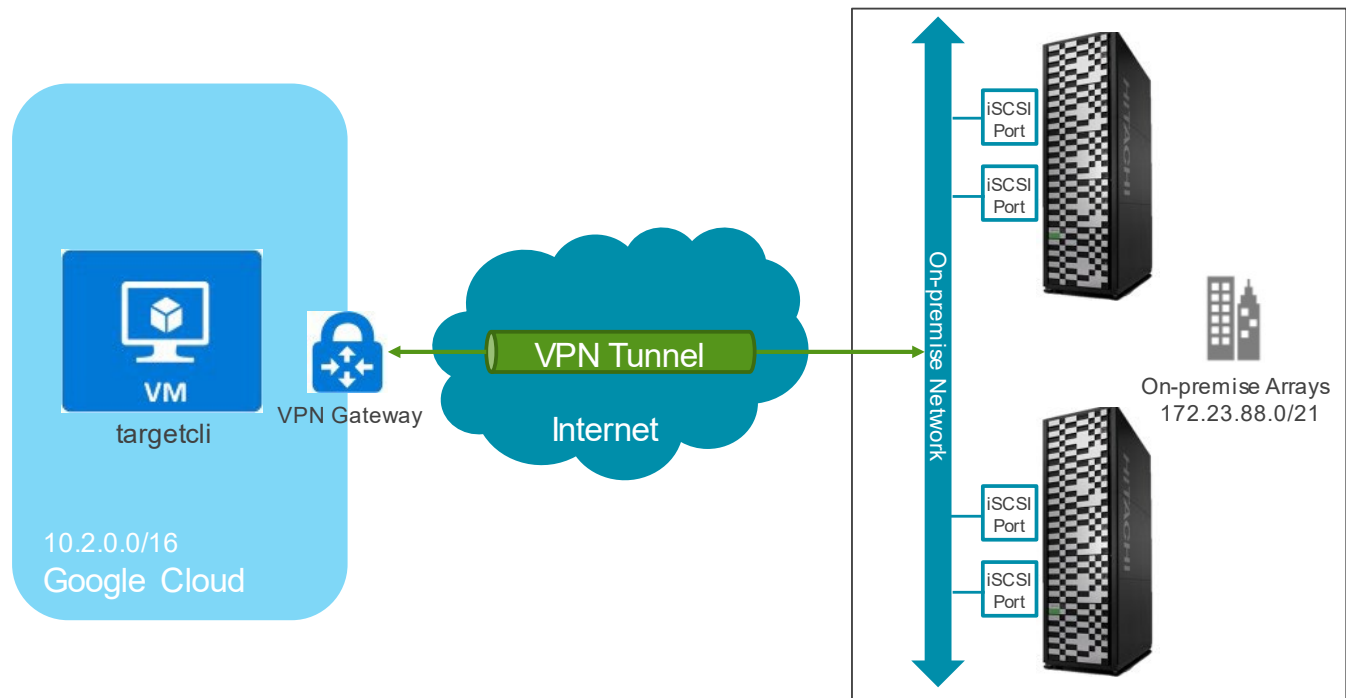


Figure 1. Test Environment

Google Cloud Virtual Machine

The following settings were used for the virtual machine image:

- Operating system: SUSE Linux Enterprise Server 15 SP1
- Kernel: 4.12.14-197.83-default
- Instance type: e2-medium
 - CPU: 1 virtual CPU
 - Memory: 4 GB
- Targetcli version: targetcli-2.1.fb49

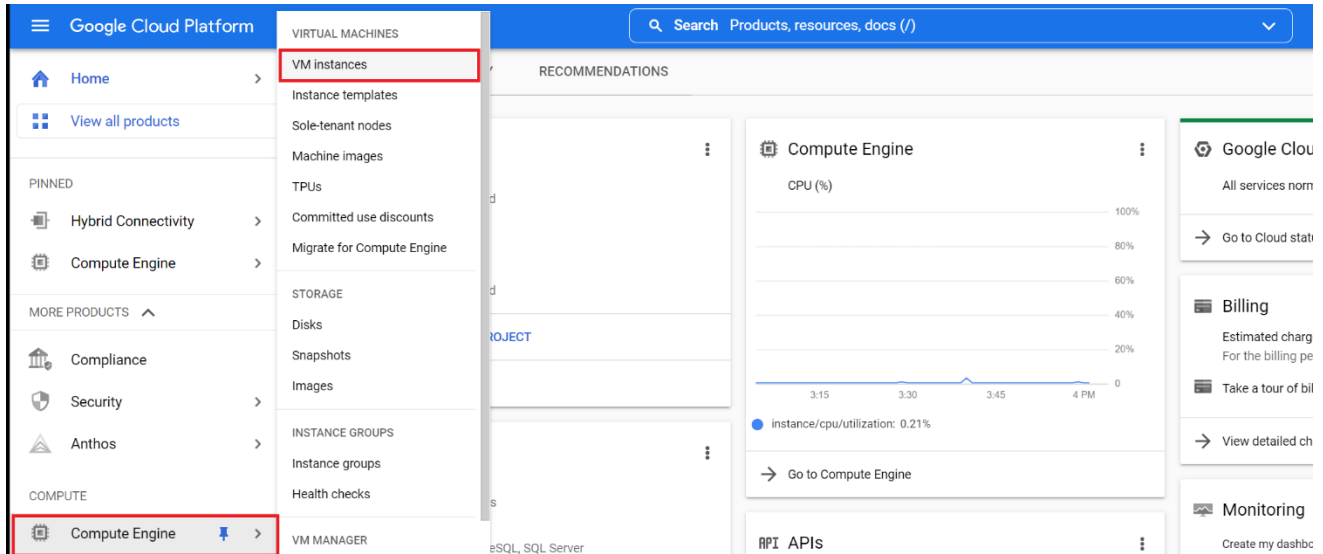
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Google Cloud Virtual Machine Instance

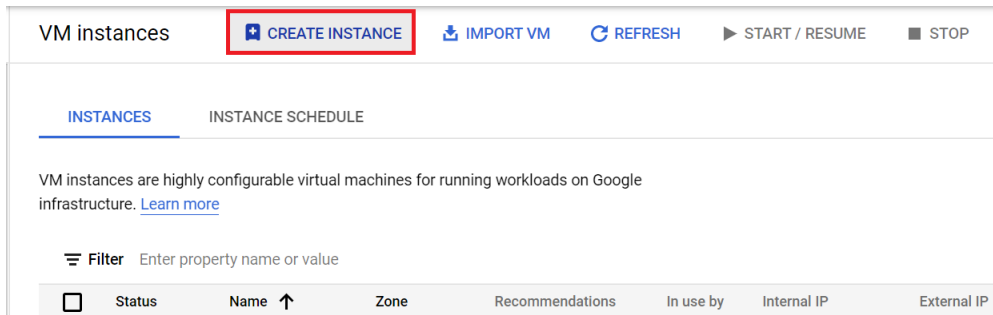
Deployment

This section provides instructions for deploying the virtual machine on Google Cloud.

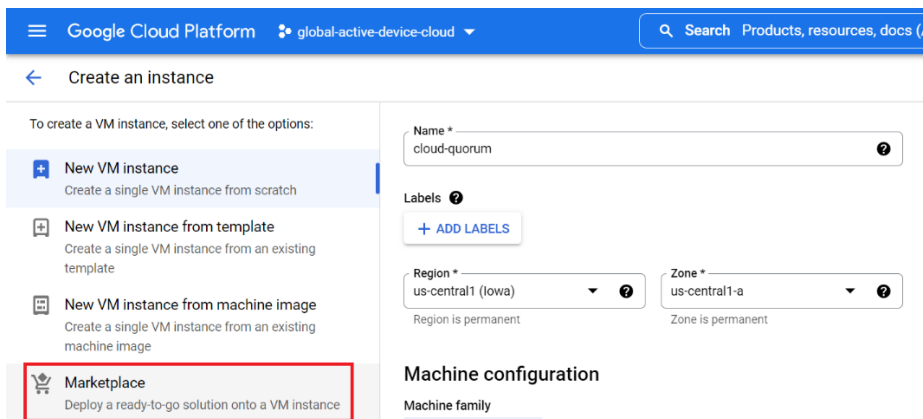
1. From the Google Cloud Platform home page, navigate to **Compute Engine**, and then click **VM instances**.



2. Click **Create Instance**.



3. Click **Marketplace**.



Global-Active Device Quorum on Google Cloud Platform

- On the marketplace page, search for **SUSE Enterprise Linux 15 SP1 BYOS**.

×

The screenshot shows the Google Cloud Marketplace interface. At the top, there's a search bar with the text "SUSE Enterprise Linux 15 SP1 BYOS". Below the search bar, the breadcrumb path is "Marketplace > 'SUSE Enterprise Linux 15 SP1 BYOS' > Virtual machines". A filter bar shows "Filter Type to filter". Under the "Type" section, "Virtual machines" is selected. The results section shows "2 results". The first result is "SUSE Linux Enterprise Server 15 SP1 BYOS" by SUSE, which is highlighted with a red box. Below it, there's a description: "SUSE Linux Enterprise Server is one of the leading Enterprise distributions. With the introduction of modules SLES 15 is the distribution bridging the requirements gap between faster moving stacks with a long term maintained stable base." The second result is "SUSE Linux Enterprise Server 15 SP1 for SAP BYOS" by SUSE.

- Click **Launch**.

The screenshot shows the product page for "SUSE Linux Enterprise Server 15 SP1 BYOS" by SUSE. The SUSE logo is on the left. The product name "SUSE Linux Enterprise Server 15 SP1 BYOS" is prominently displayed. Below it, the text "SUSE Linux Enterprise Server 15 SP1 BYOS" is repeated. At the bottom, there is a blue "LAUNCH" button highlighted with a red box.

- Enter a name for your virtual machine and select a **Region** and **Zone** for which you have configured your VPN tunnel. Keep the default values for **Series** and **Machine type**: E2 and e2-medium.

The screenshot shows the "Create an instance" page in the Google Cloud Compute Engine console. The left sidebar shows the navigation menu with "Virtual machines" expanded. The main content area has several fields: "Name" (cloud-quorum), "Labels" (ADD LABELS), "Region" (us-central1 (Iowa)), and "Zone" (us-central1-a). The "Machine configuration" section shows "Machine family" (GENERAL-PURPOSE), "Series" (E2), and "Machine type" (e2-medium (2 vCPU, 4 GB memory)). A table on the right shows the "Monthly estimate" of \$25.46, broken down by item: 2 vCPU + 4 GB memory (\$24.46), 10 GB balanced persistent disk (\$1.00), and Sustained use discount (-\$0.00). The bottom of the page shows a diagram of the machine configuration with 2 vCPU and 4 GB memory.

Global-Active Device Quorum on Google Cloud Platform

7. Scroll down and expand the **NETWORKING, DISKS, SECURITY, MANAGEMENT, SOLE-TENANCY** option.

✓ **NETWORKING, DISKS, SECURITY, MANAGEMENT, SOLE-TENANCY**

8. Under **Network interfaces**, verify that you have selected the network interface and subnet for your VPN tunnel.

Network interfaces ⓘ

Network interface is permanent

Edit network interface ^

☒ Networks in this project

☐ Networks shared with me (from host project: "hv-lab-vpc")

Network *

 global-active-device-cloud-quorum-vpc

Subnetwork *

 sis-lab-subnet ()

Primary internal IP


 Ephemeral (Automatic)

Alias IP ranges

[+ ADD IP RANGE](#)

External IP

 None

 The "External IPs for VM instances" organization policy does not allow associating an external IP address with this instance. Contact your org policy admin to change. [Learn more](#)

9. Under **Disks**, click **ADD NEW DISK** and add a disk of minimum 67 GB.

Add new disk ✕

Name *

 disk-7

Name is permanent

Description

Source

Create a blank disk, apply a bootable disk image, or restore a snapshot of another disk in this project.

 Disk source type *

 Blank disk

Disk settings

 Disk type *

 Balanced persistent disk

[COMPARE DISK TYPES](#)

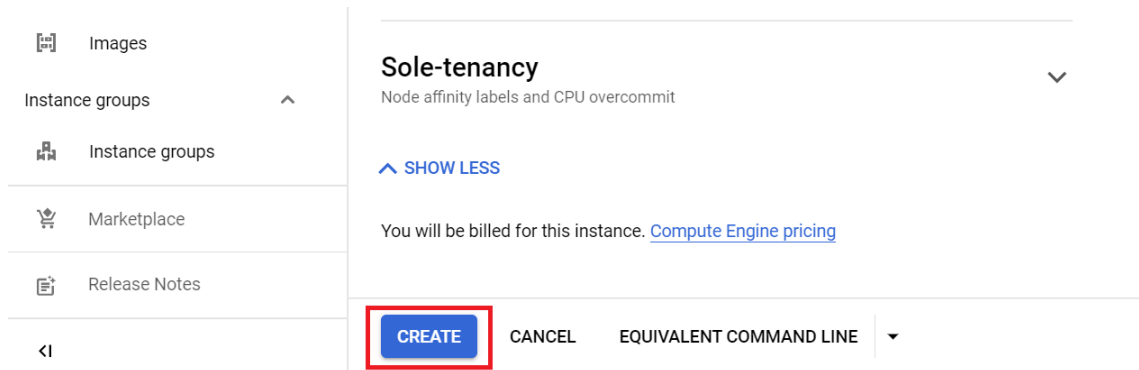
Size *

 67

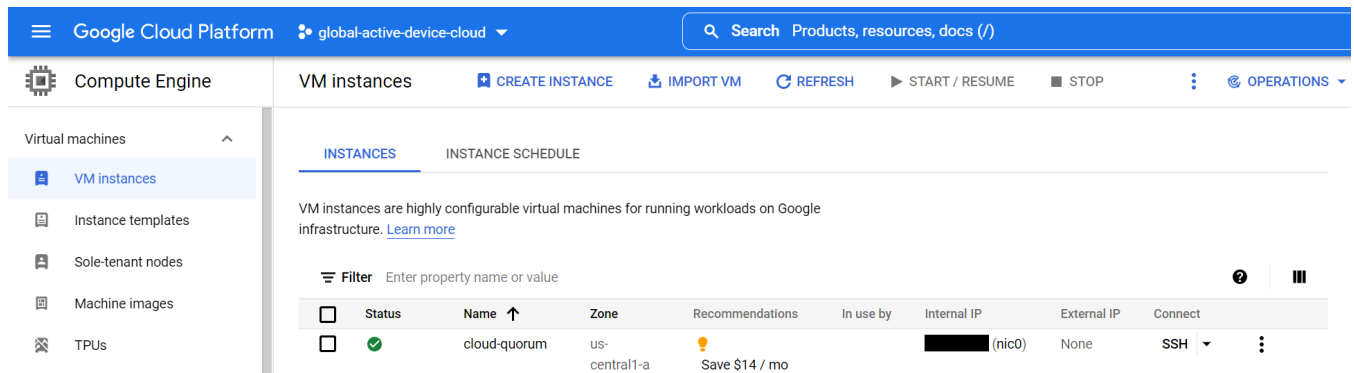
Provision between 10 and 65,536 GB

Global-Active Device Quorum on Google Cloud Platform

10. Verify the settings and click **CREATE**.



11. Verify that the new instance is running on the **VM Instances** screen.

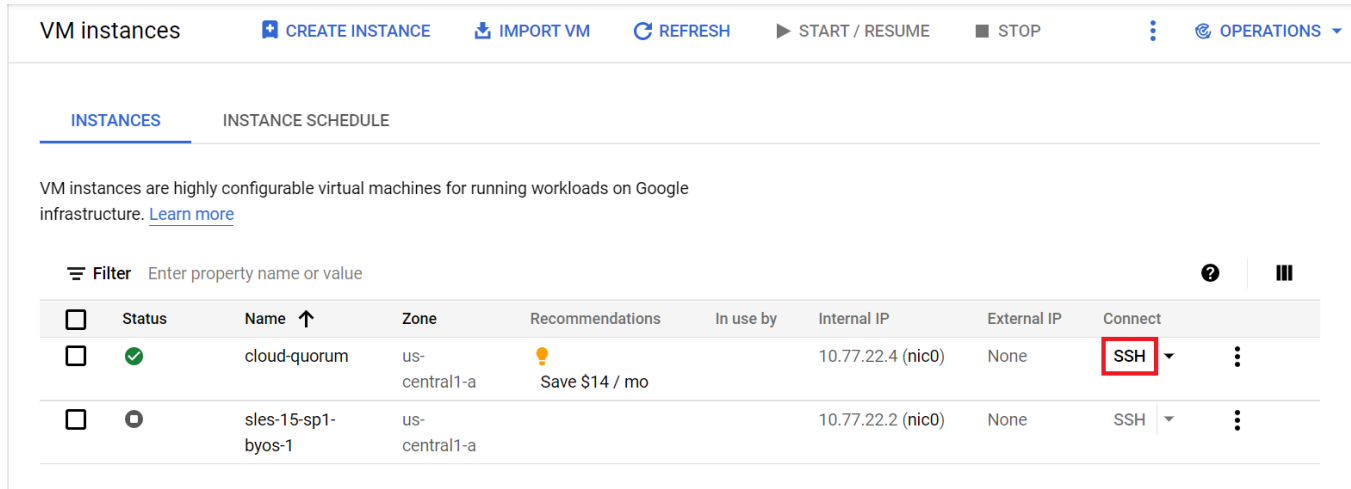


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Remote Access

This section provides instructions for remotely accessing the virtual machine using the Google Cloud Platform SSH client.

On the **VM Instances** page, go to the entry for the cloud quorum VM and click **SSH**.

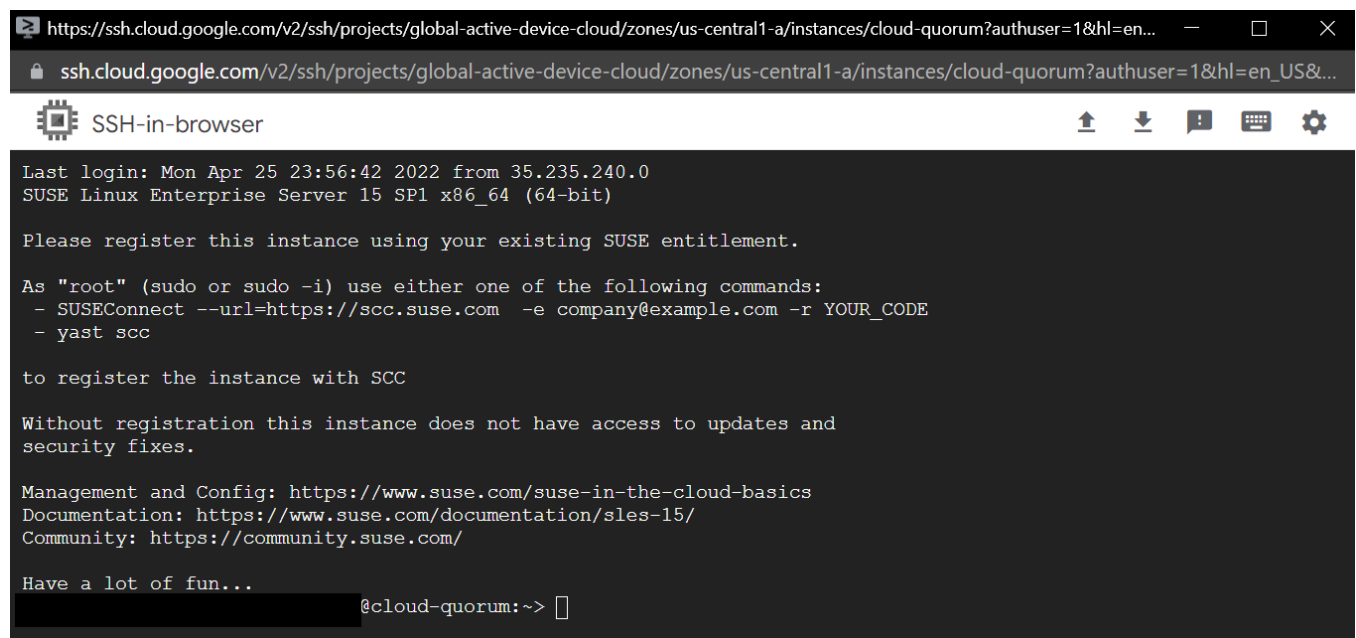


VM instances are highly configurable virtual machines for running workloads on Google infrastructure. [Learn more](#)

Filter Enter property name or value

Status	Name	Zone	Recommendations	In use by	Internal IP	External IP	Connect
	cloud-quorum	us-central1-a	Save \$14 / mo		10.77.22.4 (nic0)	None	SSH
	sles-15-sp1-byos-1	us-central1-a			10.77.22.2 (nic0)	None	SSH

An **SSH-in-browser** window opens that is logged into your virtual machine. If you have trouble connecting, follow the prompts.



https://ssh.cloud.google.com/v2/ssh/projects/global-active-device-cloud/zones/us-central1-a/instances/cloud-quorum?authuser=1&hl=en...
ssh.cloud.google.com/v2/ssh/projects/global-active-device-cloud/zones/us-central1-a/instances/cloud-quorum?authuser=1&hl=en_US&...

SSH-in-browser

```
Last login: Mon Apr 25 23:56:42 2022 from 35.235.240.0
SUSE Linux Enterprise Server 15 SP1 x86_64 (64-bit)

Please register this instance using your existing SUSE entitlement.

As "root" (sudo or sudo -i) use either one of the following commands:
- SUSEConnect --url=https://scc.suse.com -e company@example.com -r YOUR_CODE
- yast scc

to register the instance with SCC

Without registration this instance does not have access to updates and
security fixes.

Management and Config: https://www.suse.com/suse-in-the-cloud-basics
Documentation: https://www.suse.com/documentation/sles-15/
Community: https://community.suse.com/

Have a lot of fun...
@cloud-quorum:~>
```

Global-Active Device Quorum on Google Cloud Platform

Storage Repository

This section provides instructions for automatically configuring a storage repository on the virtual machine to contain the volumes to use as GAD Quorum devices.

1. Log in to the virtual machine using SSH.
2. Create a file by entering `vi quorum_setup.sh` and then copy and paste the following script into the file:

```
function startTC(){
    sudo systemctl enable --now targetcli >> ~/setup_log.txt
}
function checkFSTAB(){
    existing_vol=$(grep "/dev/vg_quorums/lvol0 /quorums xfs defaults 0 0" /etc/fstab)
    if [ "$existing_vol" = "" ]
    then
        sudo sh -c "echo /dev/vg_quorums/lvol0 /quorums xfs defaults 0 0 >> /etc/fstab"
    fi
    sudo mount /quorums >> ~/setup_log.txt
    df -h
}
function configFDISK(){
    (echo "n"
    echo "p"
    echo "1"
    echo ""
    echo ""
    echo "p"
    echo "w") | sudo fdisk /dev/"$1" > ~/setup_log.txt
}
function configVOLS(){
    sudo vgcreate vg_quorums /dev/"$1"1 >> ~/setup_log.txt
    sudo lvcreate -l 100%VG vg_quorums >> ~/setup_log.txt
    sudo mkfs.xfs /dev/vg_quorums/lvol0 >> ~/setup_log.txt
    sudo mkdir /quorums >> ~/setup_log.txt
}
function volsToTCLIF(){
    (echo "backstores/fileio create volume0 /quorums/volume0 13g"
    echo "/iscsi create"
    echo "exit") | sudo targetcli > ~/temp.txt
}
function getTargetName(){
    cat ~/temp.txt >> ~/setup_log.txt
    target_name="$(grep ign ~/temp.txt | awk '{ print $4 }')"
    target_name=${target_name%.}
}
function getIP(){
    my_ip="$(hostname -I)"
}
function getInitiatorID(){
    (echo "cd /iscsi/$target_name/tpgl/acls/"
    echo "ls"
    echo "create $1"
    echo "exit") | sudo targetcli >> ~/setup_log.txt
}
function mapLUNS(){
    (echo "cd /iscsi/$target_name/tpgl/portals/"
    echo "delete 0.0.0.0 3260"
    echo "create $my_ip"
    echo "ls"
    echo "cd ../luns"
    echo "create /backstores/fileio/volume0"
    echo "cd /"
    echo "ls"
    echo "saveconfig") | sudo targetcli >> ~/setup_log.txt
}
function checkSetup(){
    check="$(echo ls | sudo targetcli | grep iscsi | grep "Targets: 0")"
    if [ "$check" == "" ]; then
        echo "Quorum already configured."
        exit 0
    fi
}
```

Global-Active Device Quorum on Google Cloud Platform

```

        fi
    }
    checkSetup
    DISK="$(sudo fdisk -l | grep "Disk /dev/" | tail -n 1 | cut -d "/" -f3 | cut -d ":" -f1)"
    configFDISK "$DISK"
    configVOLS "$DISK"
    checkFSTAB
    startTC
    volsToTCLI
    getTargetName
    getIP
    for iqn in "$@"
    do
        getInitiatorID "$iqn"
    done
    mapLUNS
    rm ~/temp.txt

```

3. To save the file content, press **Esc**, type **:wq**, and then press **Enter**.

```

getTargetName
getIP
for iqn in "$@"
do
    getInitiatorID "$iqn"
done
mapLUNS
rm ~/temp.txt

:wq

```

4. To make the file executable, run the following command:

```
sudo chmod 555 quorum_setup.sh
```

```

Management and Config: https://www.suse.com/suse-in-the-cloud-basics
Documentation: https://www.suse.com/documentation/sles-15/
Community: https://community.suse.com/

```

Have a lot of fun...

```

kevin_tang_hitachivantara_com@cloud-quorum:~> vi quorum_setup.sh
kevin_tang_hitachivantara_com@cloud-quorum:~> sudo chmod 555 quorum_setup.sh

```

5. Run the following command followed by the IQNs of the iSCSI ports on your storage systems:

```
quorum_setup.sh
```

The following is an example of the output:

```

_com@cloud-quorum:~> ./quorum_setup.sh iqn.1994-04
.jp.co.hitachi:rsd.r90.i.08758b.1e iqn.1994-04.jp.co.hitachi:rsd.r90.i.0875
8b.2e iqn.1994-04.jp.co.hitachi:rsd.r90.i.08758a.1e iqn.1994-04.jp.co.hitac
hi:rsd.r90.i.08758a.2e
Filesystem                Size      Used Avail Use% Mounted on
devtmpfs                  2.0G      8.0K  2.0G   1% /dev
tmpfs                     2.0G         0  2.0G   0% /dev/shm
tmpfs                     2.0G     9.0M  2.0G   1% /run
tmpfs                     2.0G         0  2.0G   0% /sys/fs/cgroup
/dev/sda3                 10G     1.6G   8.5G  16% /
/dev/sda2                  20M     2.8M   18M  14% /boot/efi
tmpfs                     394M         0  394M   0% /run/user/1629402879
/dev/mapper/vg_quorums-lvol10 100G    135M  100G   1% /quorums
Created symlink /etc/systemd/system/remote-fs.target.wants/targetcli.servic
e → /usr/lib/systemd/system/targetcli.service.
_com@cloud-quorum:~>

```

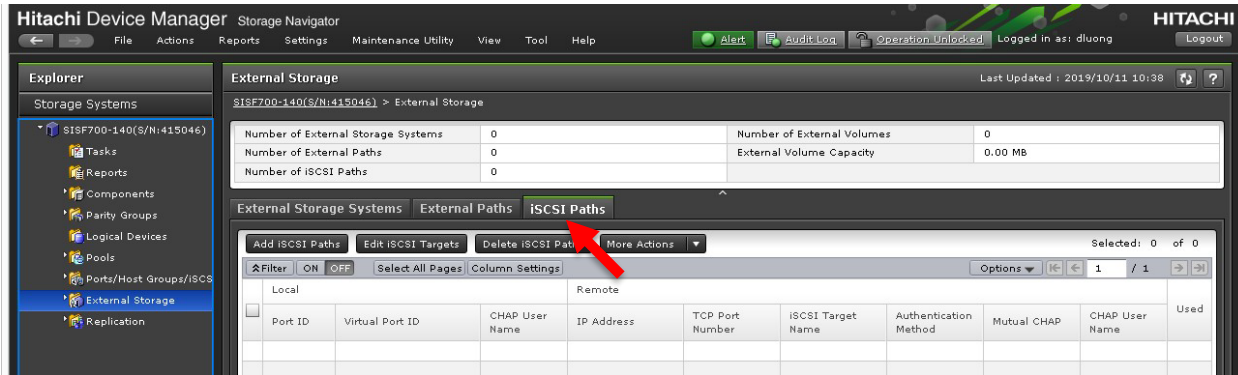
Global-Active Device Quorum on Google Cloud Platform

Global-Active Device Quorums

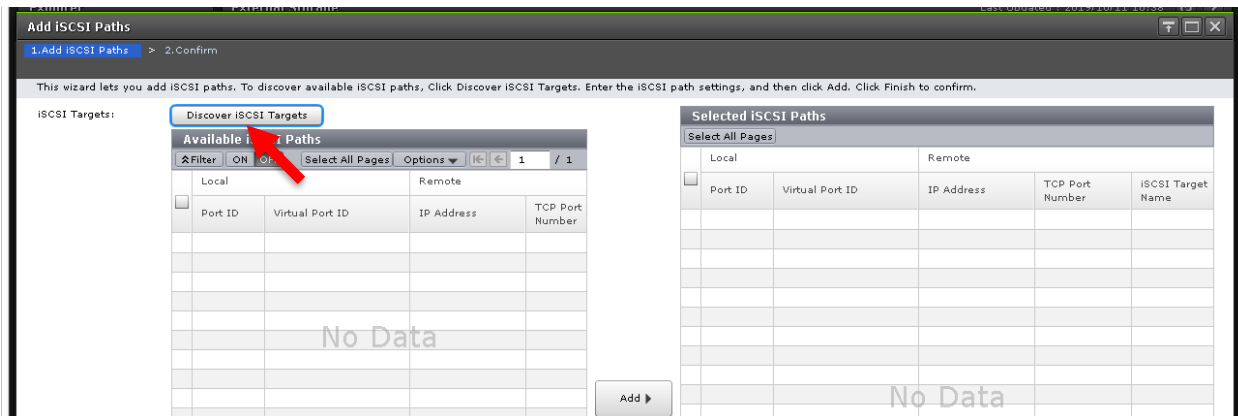
This section describes how to discover the volumes from the iSCSI target virtual machine and turn them into GAD quorums. The procedure is the same as it is to virtualize a physical Fiber Channel or iSCSI storage system.

Create iSCSI Paths

1. Log in to Storage Navigator.
2. On the left side, select **External Storage**, and then select the **iSCSI Paths** tab.



3. Click **Add iSCSI Paths**.
4. Click **Discover iSCSI Targets**.



5. Add both iSCSI paths. Repeat this step for both paths.
 - a. Select the storage port from the **Local Port ID** list.
 - b. Enter the private IP address of the virtual machine.
 - c. For **Remote TCP Port Number**, enter **3260**.

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- d. Click **Add**.

Discover iSCSI Targets

Enter the required information to discover the iSCSI paths. Click Add to add the discovery targets, and then click OK.

Local Port ID:

Local Virtual Port ID:

Remote IP Address: ☒ IPv4 ☐ IPv6

Remote TCP Port Number: (1-65535)

Add

Discovery List

Local	Port ID	Virtual Port ID	Remote	IP Address	TCP Port Number
<input checked="" type="checkbox"/>	CL2-A	-		172.31.24.72	3260
<input type="checkbox"/>	CL1-A	-		172.31.24.72	3260

6. After creating both iSCSI paths, click **OK**.
7. In the **Add iSCSI Paths** window, set the following:
- From the **Authentication Method** drop-down list, click **None**.
 - For **Mutual CHAP**, click **Disable**.

Authentication Method:

Mutual CHAP: ☐ Enable ☒ Disable

User Name:

Secret:

8. Click **Add** and then click **Finish**.

Add iSCSI Paths

1. Add iSCSI Paths > 2. Confirm

This wizard lets you add iSCSI paths. To discover available iSCSI paths, Click Discover iSCSI Targets. Enter the iSCSI path settings, and then click Add. Click Finish to confirm.

Discover iSCSI Targets

Available iSCSI Paths

Local	Port ID	Virtual Port ID	Remote	IP Address	TCP Port Number
No Data					

Selected iSCSI Paths

Local	Port ID	Virtual Port ID	Remote	IP Address	TCP Port Number	iSCSI Target Name
<input checked="" type="checkbox"/>	CL2-A	-		172.31.24.72	3260	iqn.2003-01...
<input checked="" type="checkbox"/>	CL1-A	-		172.31.24.72	3260	iqn.2003-01...

Add

The following shows the created paths:

External Storage Systems

External Paths

iSCSI Paths

Add iSCSI Paths Edit iSCSI Targets Delete iSCSI Paths More Actions

Selected: 0 of 2

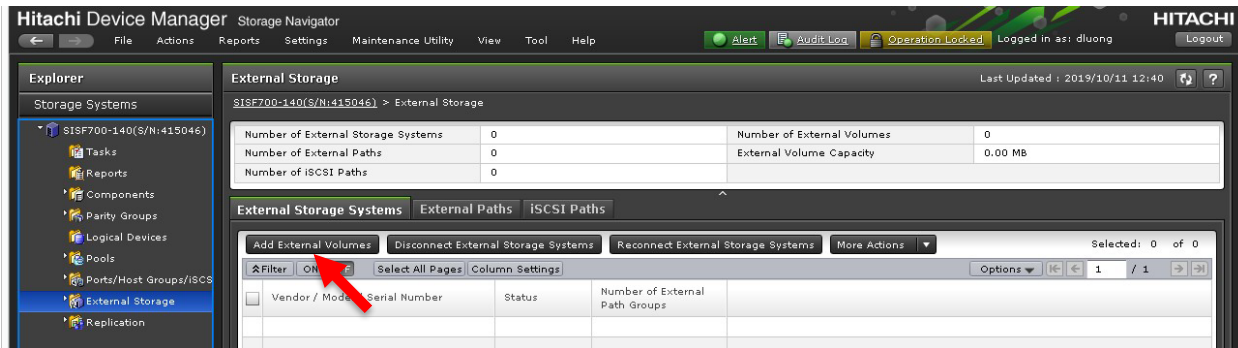
Local	Port ID	Virtual Port ID	CHAP User Name	Remote	IP Address	TCP Port Number	iSCSI Target Name	Authentication Method	Mutual CHAP	CHAP User Name	Used
<input checked="" type="checkbox"/>	CL1-A	-			172.31.24.72	3260	iqn.2003-01...	None	Disabled		No
<input checked="" type="checkbox"/>	CL2-A	-			172.31.24.72	3260	iqn.2003-01...	None	Disabled		No

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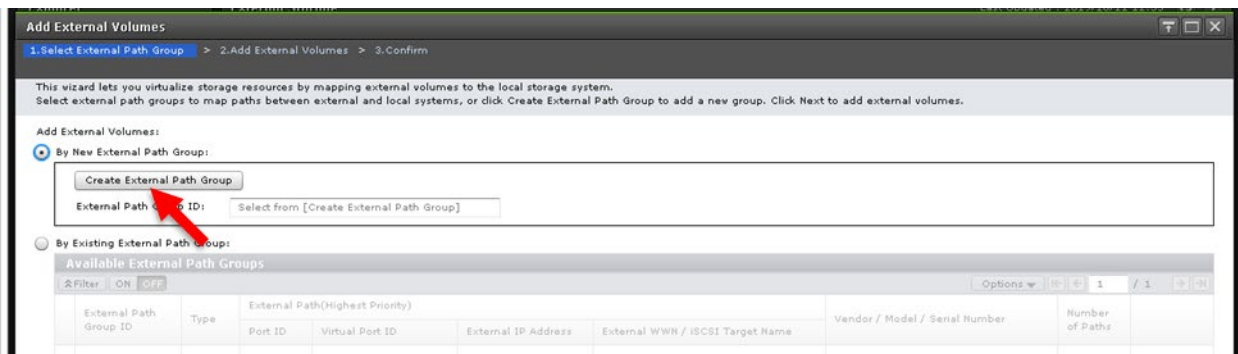
Discover External Volumes

This section describes how to discover the volumes from the iSCSI virtual machine and virtualize them.

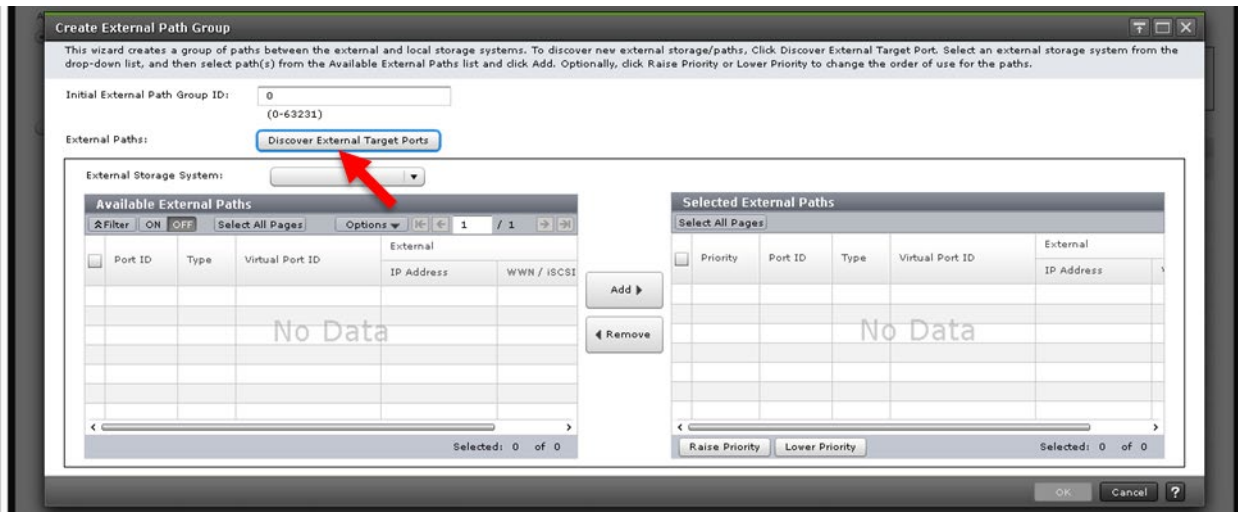
1. Select the **External Storage Systems** tab and then click **Add External Volumes**.



2. Click **Create External Path Group**.

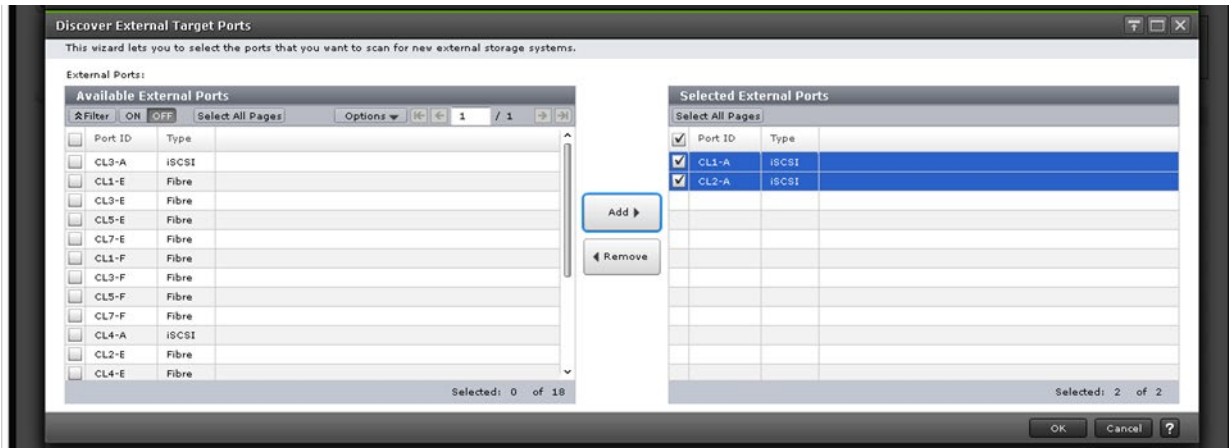


3. Click **Discover External Target Ports**.

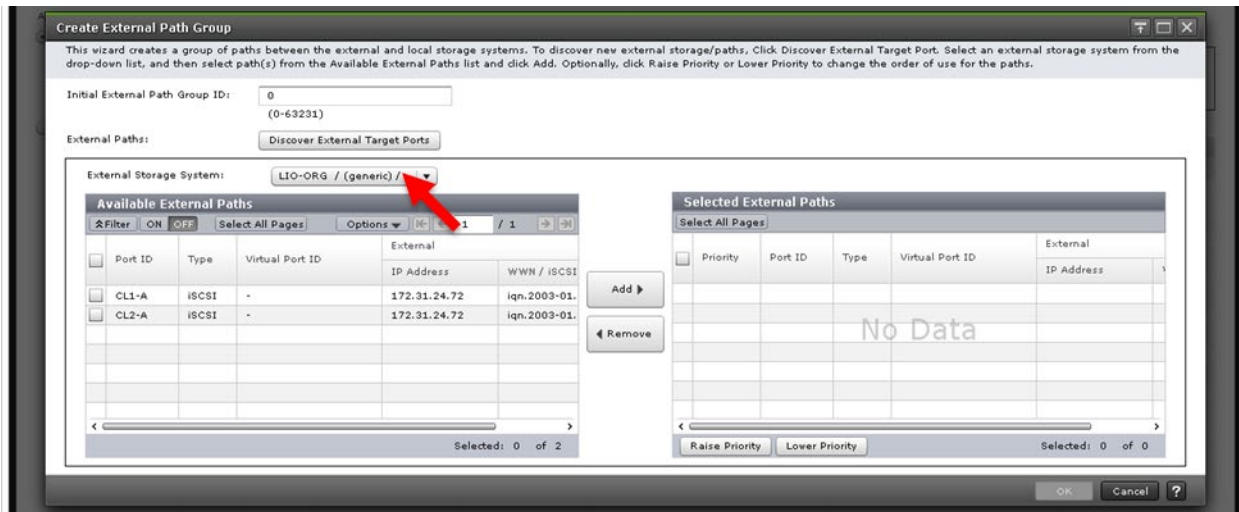


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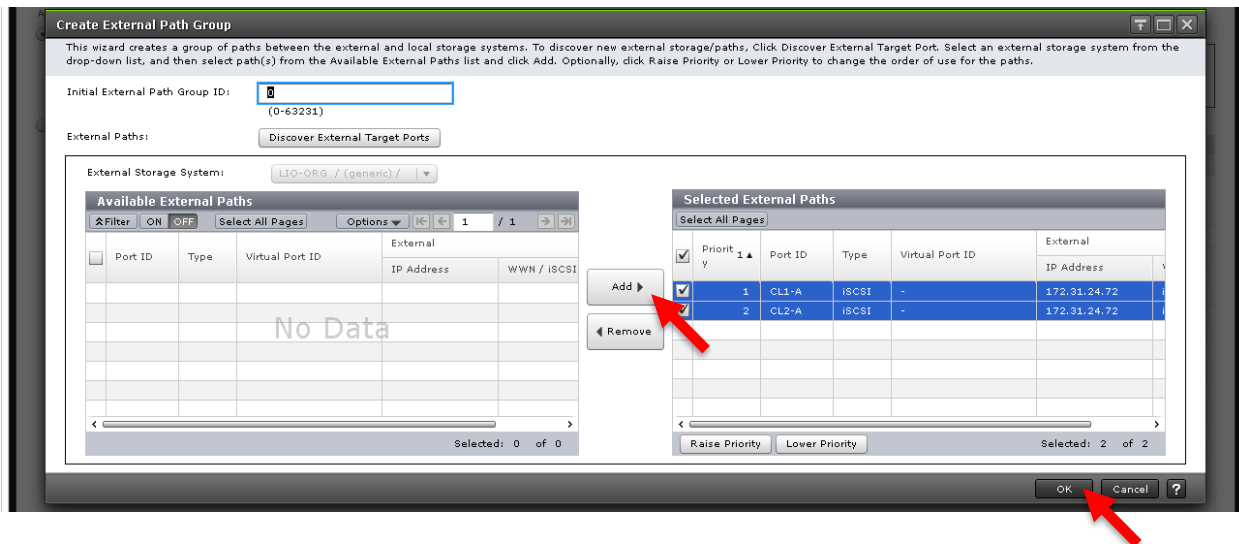
- Select the iSCSI ports, click **Add**, and then click **OK**.



If the discovery is successful, the virtual machine shows up as LIO-ORG.



- Select the discovered external paths, click **Add**, and then click **OK**.



Global-Active Device Quorum on Google Cloud Platform

- On the Add External Volumes window, click **Next**.
- Select the discovered volumes and click **Add**.

Add External Volumes

1. Select External Path Group > 2. Add External Volumes > 3. Confirm

This wizard lets you virtualize storage resources by mapping external volumes to the local storage system. Select external path groups to map paths between external and local systems, or click Create External Path Group to add a new group. Click Next to add external volumes.

External Volumes:

Discovered External Volumes

LUN ID (Highest Priority)	Device Name	Capacity	Volume Properties	Device ID	Drive Info
No Data					

Selected: 0 of 0

Initial Parity Group ID: E 1 - 1 (1-16384) (1-4096)

Data Direct Mapping: ☐ Enable ☒ Disable

Allow Simultaneous Creation of LDEVs: ☒ Yes ☐ No

Use External Storage System Configuration: ☒ Yes ☐ No

LDEV Name: Prefix Initial Number (Max. 32 characters total including max. 9-digit number, or blank)

Options

Initial LDEV ID: LDKC CU DEV 00 : 00 : 00 Interval 0 View LDEV IDs

Number of LDEVs per External Volume: 1 (1)

Cache Partition: 0:CLPR0

Cache Mode: ☐ Enable ☒ Disable

Inflow Control: ☐ Enable ☒ Disable

Use ALUA as Path Mode: Depends on the selected external volume(s)

Load Balance Mode: Depends on the selected external volume(s)

MP Unit ID: Auto

Selected External Volumes

LUN ID (Highest Priority)	Device Name	Volume Properties	Device ID	Drive Info
<input checked="" type="checkbox"/> 0	volume1	0000	6001405D86...	
<input checked="" type="checkbox"/> 1	volume2	0001	60014059C1...	
<input checked="" type="checkbox"/> 2	volume3	0002	60014055F75...	

Add

Change Settings Remove More Actions Selected: 3 of 3

Next Task Option: Continue to Add LUN Paths Back Next Finish Cancel

- Click **Finish** and then click **Apply**.

The following shows the external volumes after they have been virtualized:

Hitachi Device Manager Storage Navigator

SISF700-140(S/N:415046) > External Storage > LIO-ORG / (generic) / > EPathGroup0

Status: Normal Number of External Volumes: 3

Vendor / Model / Serial Number: LIO-ORG / (generic) / External Volume Capacity: 39.00 GB

Number of External Paths: 2 (Max Allowed: 8)

Mapped Volumes

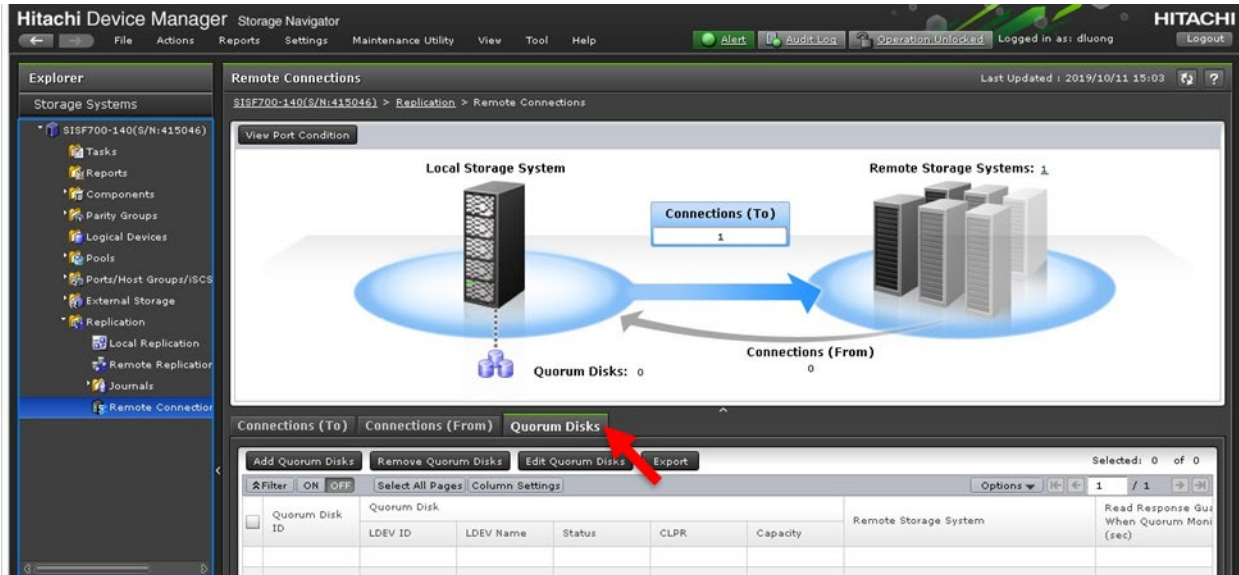
Parity Group ID	Status	Top LDEV ID	Top LDEV Name	Device Name	Number of LDEVs	Capacity	Volume Properties	Device ID	Drive Info	MP Unit
E1-1	Normal	00:00:40		volume1	1	13.00 GB	0000	6001405D86...		MPU-
E1-2	Normal	00:00:41		volume2	1	13.00 GB	0001	60014059C1...		MPU-
E1-3	Normal	00:00:42		volume3	1	13.00 GB	0002	60014055F75...		MPU-

Global-Active Device Quorum on Google Cloud Platform

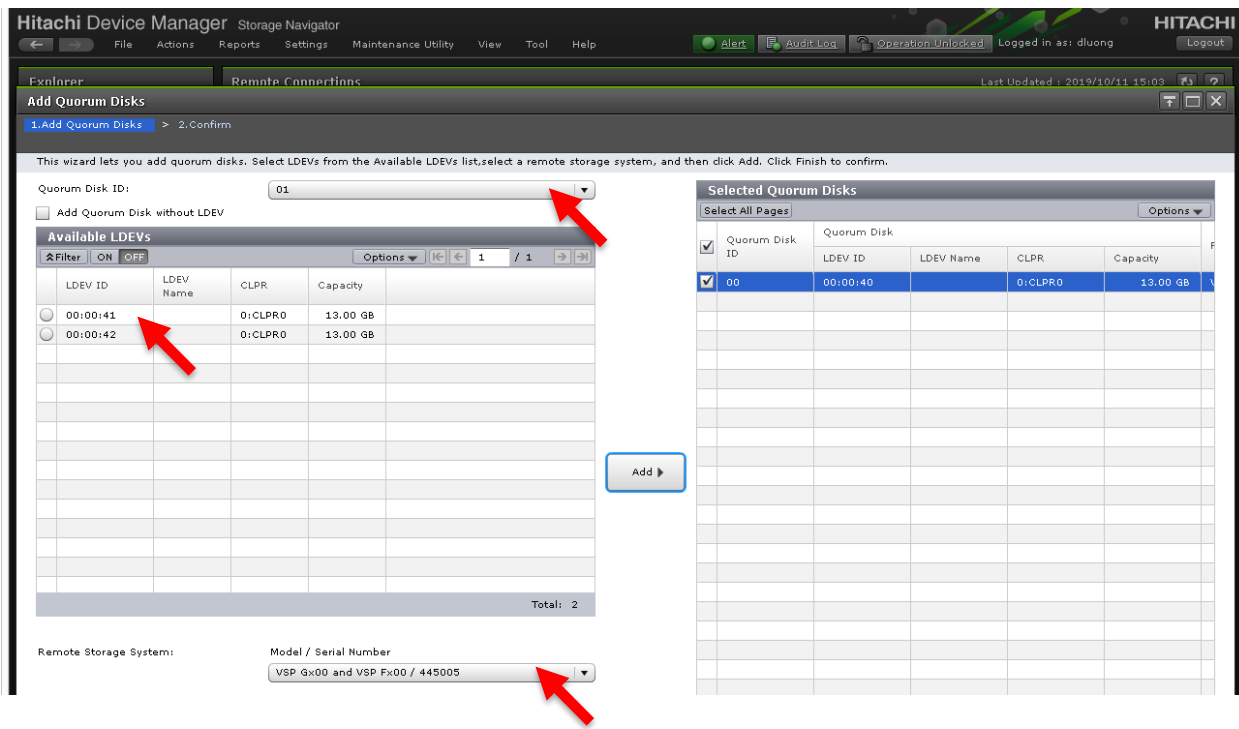
Define Global-Active Device Quorums

This section describes how to turn the external volumes into GAD quorums. The procedure is the same as it is to a virtualized physical Fiber Channel or iSCSI storage system.

1. Select **Replication > Remote Connections**, and then select the **Quorum Disks** tab.



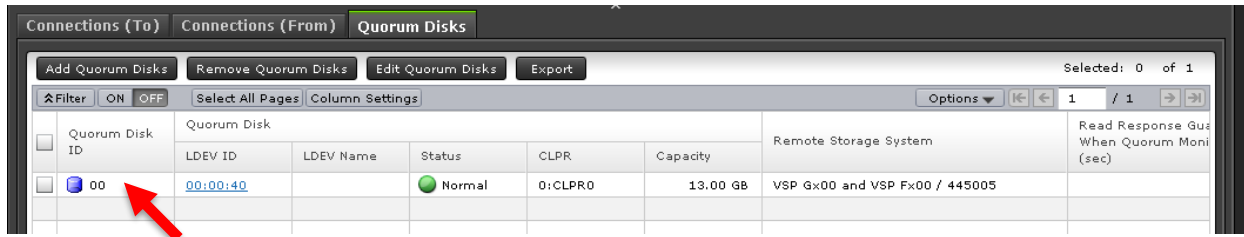
2. Click **Add Quorum Disks**.
3. In the Add Quorum Disks screen, choose the appropriate option from the **Quorum Disk ID** and the **Remote Storage System** list.
4. From the Available LDEVs table, select the external volume you want to use and click **Add**.



5. Click **Finish** and then click **Apply**.

Global-Active Device Quorum on Google Cloud Platform

The following shows the quorum after it has been created:



Connections (To)		Connections (From)		Quorum Disks			
Add Quorum Disks		Remove Quorum Disks		Edit Quorum Disks		Export	
Filter	ON	OFF	Select All Pages	Column Settings	Options	Selected: 0 of 1	
Quorum Disk ID	LDEV ID	LDEV Name	Status	CLPR	Capacity	Remote Storage System	Read Response Gu... When Quorum Moni... (sec)
<input type="checkbox"/> 00	00:00:40		● Normal	0:CLPR0	13.00 GB	VSP Gx00 and VSP Fx00 / 445005	