

iSCSI Target Using AWS Virtual Machine

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About This Guide

This guide provides instructions for deploying a virtual machine in the Amazon Web Services (AWS) cloud and configuring it as an iSCSI target.



After the original publication of this whitepaper, Hitachi Vantara released a virtual machine image on Amazon Marketplace that automates the process of configuring targetcli. The solution is available for free on the Amazon Marketplace. However, you must pay for various AWS fees relating to running the virtual machine. The solution can be found at https://aws.amazon.com/marketplace/pp/prodview-7yn64ltekhjus.

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	November 2019	Initial release.
1.1	April 2022	Added recommendation to remove public IP address on the AWS virtual machine and added GAD Cloud Quorum solution. Also made wording corrections and formatting updates.

References

Hitachi Global-Active Device User Guide

Contributors

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

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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 the Amazon Web Services (AWS) 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 AWS 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 AWS. Refer to the AWS documentation, such as <u>AWS Site-to-Site VPN</u>.

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





AWS Virtual Machine

The following settings were used for the virtual machine image:

- Operating system: Amazon Linux 2
- Kernel: 4.14.123-111.109.amzn2.x86_64
- Instance type: t2.nano
 - CPU: Intel Xeon CPU E5-2676 v3 @ 2.40 GHz
 - Memory: 512 MB
- Targetcli version: targetcli-2.1.fb46-6.amzn2.noarch

Amazon Virtual Machine Instance

Deployment

This section provides instructions for deploying the virtual machine using an Amazon Machine Instance.

1. In the AWS Management Console, use the top-right shortcut to expand the **Region** list and select a region.



2. On the top left, select Services > Compute > EC2.



3. Click Launch Instance.

	Create Instance	Migrate a Machine	All EC2 Resources
AMIs	To start using Amazon EC2 you will want to	Use CloudEndure Migration to simplify,	Forums
Bundle Tasks	launch a virtual server, known as an Amazon EC2 instance.	expedite, and automate large-scale migrations from physical, virtual, and cloud-based	Contact Us
ELASTIC BLOCK	Launch Instance	infrastructure to AWS.	
Volumes		Get started with CloudEndure Migration 🖻	AWS Marketplace
Snapshots Lifecycle Manager	Note: Your instances will late thin the US West (N. California) region		Find free software trial products in the AWS Marketplace from the



4. Locate Amazon Linux 2 AMI and click Select.

aws s	rvices 🗸 Resource	Groups 🗸 🍾	Ω u	sersGroupAdmin/dLuong@hit.	. 👻 N. Califorr	nia 🕶 Support 🕶
1. Choose AMI 2. Cl	ose Instance Type 3. Con	figure Instance 4. Add S	torage 5. Add Tags	6. Configure Security Group	7. Review	
AMI is a template that I provided by AWS, o	e an Amazon M contains the software con r user community, or the A	achine Image figuration (operating syst WS Marketplace; or you	(AMI) em, application server, can select one of your	and applications) required to I own AMIs.	aunch your instan	Cancel and Exit ce. You can select an
Search for an AMI	entering a search term e.	g. "Windows"				×
Quick Start					< < 1 to 3	8 of 38 AMIs > >
My AMIs	U	Amazon Linux 2 Al	MI (HVM), SSD Volum	e Type - ami-0245d318c67	88de52	Select
AWS Marketplace	Amazon Linux Free tier eligible	Amazon Linux 2 comes performance on Amazo	with five years support. n EC2, systemd 219, GC	t provides Linux kernel 4.14 tune C 7.3, Glibc 2.26, Binutils 2.29.1	ed for optimal , and the latest	64-bit (x86)
Community AMIs		software packages thro Root device type: ebs V	ugh extras. /irtualization type: hvm EM	IA Enabled: Yes		

5. Select the instance type (we tested with the t2.nano type) and click **Next: Configure Instance Details**.

a	NS Services	 Resource 	Groups 🗸	*	↓ UsersGroupA	dmin/dLuong@hit 👻	N. California 👻 S	upport 👻
1. Choos	e AMI 2. Choose Insta	ince Type 3. Co	nfigure Instance	4. Add Storage	5. Add Tags 6. Confi	gure Security Group 7	Review	
Step 2 Amazon E combinati about inst	2: Choose an EC2 provides a wide sel ions of CPU, memory, st lance types and how the All instance types	Instance T ection of instance torage, and netwo ey can meet your of Curren	type types optimized to rking capacity, and computing needs.	o fit different use of give you the flex	cases. Instances are virtu xibility to choose the appi olumns	ual servers that can run ropriate mix of resource	applications. They haves for your applications.	e varying A
Current	tly selected: t2.nano (V	ariable ECUs, 1 v	CPUs, 2.4 GHz, Ir	itel Xeon Family,	0.5 GIB memory, EBS or	ıly)		
	Family -	Туре 👻	vCPUs (i) +	Memory (GiB)	Instance Storage (GB) ()	EBS-Optimized Available (j)	Network Performance (j)	IPv6 Support ~ (i)
	General purpose	t2.nano	1	0.5	EBS only	-	Low to Moderate	Yes
	General purpose	t2.micro Free tier eligible	1	1	EBS only	2	Low to Moderate	Yes
	General purpose	t2.small	1	2	EBS only	-	Low to Moderate	Yes
	General purpose	t2.medium	2	4	EBS only	17	Low to Moderate	Yes
	General purpose	t2.large	2	8	EBS only	-	Low to Moderate	Yes
	General purpose	t2.xlarge	4	16	EBS only	12	Moderate	Yes
	General purpose	t2.2xlarge	8	32	EBS only		Moderate	Yes
	General purpose	t3a.nano	2	0.5	EBS only	Yes	Up to 5 Gigabit	Yes
	General purpose	t3a.micro	2	1	EBS only	Yes	Up to 5 Gigabit	Yes •
				с	ancel Previous	Review and Launch	Next: Configure Ins	tance Details
Q Fee	dback 🥝 English (US)		© 2008 - 2019,	, Amazon Web Services, Inc.	or its affiliates. All rights re	served. Privacy Policy	rms of Use

6. From the **Network** dropdown list, select a network. For the initial configuration, we enabled the **Auto-assign Public IP** option to remotely access the virtual machine and download targetcli packages. Click **Next: Add Storage**.

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Global-Active Device Quorum on AWS Cloud

aws Services - R	esour	ce Groups → 🛧 🗘 UsersGroupAdmin/dLuong@hit → N. California → Support →
1. Choose AMI 2. Choose Instance Type	3. C	onfigure Instance 4. Add Storage 5. Add Tags 6. Configure Security Group 7. Review
Step 3: Configure Instan Configure the instance to suit your require assign an access management role to the	ce D ements. instance	Petails You can launch multiple instances from the same AMI, request Spot instances to take advantage of the lower pricing, e, and more.
Number of instances	()	1 Launch into Auto Scaling Group (j)
Purchasing option	(i)	Request Spot instances
Network	()	vpc-075201acbaecd164c Create new VPC No default VPC found. Create a new default VPC.
Subnet	(j)	subnet-0ab744f22f29e89a8 us-west-1a Create new subnet 65530 IP Addresses available
Auto-assign Public IP	(1)	Enable
Placement group	()	Add instance to placement group
Capacity Reservation	()	Open Create new Capacity Reservation
IAM role	(i)	None C Create new IAM role
Shutdown behavior	(1)	Stop 🔻
Enable termination protection	(1)	Protect against accidental termination
Monitoring	(j)	Enable CloudWatch detailed monitoring Additional charges apply.
Tenancy		Shared - Run a shared hardware instance Additional charges will apply for dedicated tenancy.
		Cancel Previous Review and Launch Next: Add Storage
🗨 Feedback 🔇 English (US)		© 2008 - 2019, Amazon Web Services, Inc. or its affiliates. All rights reserved. Privacy Policy Terms of 'se

After successfully setting up the virtual machine as an iSCSI target, you must secure the solution by removing the public IP.

7. Click Add New Volume.

The new volume will provide backend storage for the quorums.

. Choose AMI	2. Choo	se Instance Type 3. 0	Configure Insta	ince 4. Add Storage	5. Add Tags	6. Configure Sec	urity Group 7. F	Review
tep 4: A our instance w tit the setting orage option:	Add Sto will be laun is of the roo s in Amazon	brage ched with the following it volume. You can also n EC2.	storage dev) attach addi	ice settings. You can atta tional EBS volumes after	ch additional EE launching an in	BS volumes and i stance, but not in	nstance store vol stance store volu	umes to your instance, or mes. Learn more about
Volume Type (i)	Device ()	Snapshot (j)	Size (GiB) (j	Volume Type (i)		Throughput (MB/s) (j	Delete on Termination (i)	Encryption (j)



8. Enter the capacity for the new volume and click **Review and Launch**.

aws	Ser	vices 🗸 F	lesource Groups 🗸	*		,∆ u	sersGroupAdr	min/dLuong@hit	👻 N. California	ı ▼ Support ▼
1. Choose AMI	2. Choos	se Instance Type	3. Configure Instance	4. Add S	torage	5. Add Tags	6. Configur	e Security Group	7. Review	
Step 4: Add Your instance will b edit the settings of storage options in A	d Sto e launc the root Amazon	hed with the fo volume. You c EC2.	llowing storage device sel an also attach additional f	ttings. You EBS volur	u can atta nes after	ach additional E Iaunching an i	BS volumes nstance, but	and instance st not instance sto	tore volumes to your pre volumes. Learn m	instance, or nore about
Volume Type (j)	Device (j)	Snapshot (j)	Size (GiB) (i)	Volun	ne Type (j)	IOPS (i) Through (MB/s) (Delete on Termination	Encryption (i)
Root		/dev/xvda	snap- 06a692b9f21a43448	8	Gene	eral Purpose 5	100 / 30	000 N/A		Not Encrypte 🔻
EBS	۳	/dev/sdb ▼	Search (case-insensit	100	Gene	eral Purpose S	null	N/A		
Free tier eligibl usage restrictio	e custo ons.	mers can get u	p to 30 GB of EBS Gener	al Purposi	e (SSD)	or Magnetic sto	rage. Leam	more about free	e usage tier eligibility	and
							Cancel	Previous	Review and Launcl	Next: Add Tags
E Eadback	0 E	alich (LIS)		@ 2	000 2010	Amazon Woh S	onvicos Inc. or	ite affiliatos. All ria	ibte record	v Policy Torme of Lico



9. Verify the details and click **Launch**.

Choose AMI 2	. Choose Instance Ty	ype 3. Con	figure Instance 4. /	Add Storage 5. Add Tags	6. Configure Security Group 7. R	eview
ep 7: Rev ise review your i ess.	iew Instand nstance launch de	ce Laun etails. You car	I Ch n go back to edit cha	nges for each section. Click La	u nch to assign a key pair to your	instance and complete the launc
AMI Details						Edit AM
Free tier eligible Pree tier eligible Root	azon Linux 2 AN zon Linux 2 comes Glibc 2.26, Binutils Device Type: ebs V	MI (HVM), SS with five years 2.29.1, and th firtualization type	SD Volume Type - s support. It provides I e latest software pack : hvm	ami-0245d318c6788de52 Linux kernel 4.14 tuned for optime ages through extras.	al performance on Amazon EC2, sys	temd 219, GCC
Instance Typ	e ECUs	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance
t2.nano	Variable	1	0.5	EBS only		Low to Moderate
Security Gro	oups					Edit security group:
Security group Description	name la	aunch-wizard aunch-wizard	-2 -2 created 2019-10-	10T13:38:32.321-07:00		
Туре (ј)		Protocol ()	Port Range (j)	Source (j)	Description (i)
				This security group has no rule	25	
nstance De	tails					Edit instance details
						Cancel Previous Laun

10. If you do not have an existing key pair or do not want to use an existing key pair, use the dropdown list to select **Create a new key pair**. Enter a name for the pair and click **Download Key Pair**.

 AMI Det 	tails		Edit AMI
D	Amazon Linux	Select an existing key pair or create a new key pair X	9 600
eligible	7.3, Glibc 2.26 Root Device Type	A key pair consists of a public key that AWS stores, and a private key file that you store. Together, they allow you to connect to your instance securely. For Windows AMIs, the private key file is required to obtain the password used to log into your instance. For Linux AMIs, the private key file allows you to securely SSH into your instance.	Edit instance type
Instanc	e Type E	Note: The selected key pair will be added to the set of keys authorized for this instance. Learn more about removing existing key pairs from a public AMI.	etwork Performance
t2.nano	Vá	Create a new key pair	ow to Moderate
		Key pair name	
Security	/ Groups	key-for-documentation	Edit security groups
Security	group name	Download Key Pair	
Descripti	ion	You have to download the private key file (*.pem file) before you can continue. Serve it in a secure and accessible location. You will not be able to download the file again	
Туре	D	after it's created.	scription (j)
		Cancel Launch Instances	
Instance	e Details		Edit instance details



11. Ensure that you download the pem file to your local machine and can locate it. Click Launch Instances.



You can convert the pem file to ppk format, which can be used by PuTTY. For instructions to convert, see: <u>https://tecadmin.net/convert-pem-to-ppk-via-putty/</u>

12. Verify that the **Instance State** of the new instance is running on the **Instances** screen. The new instance must be online and accessible.



Remote Access

This section provides instructions for remotely accessing the new virtual machine using PuTTY.

1. On the PuTTY Configuration window, under Category, select Connection > SSH > Auth. Click Browse to locate the ppk file.



2. Under Category, select Session, and enter the IP address. Under Connection type, select SSH and then click Open.

🕵 PuTTY Configurati	on		? ×
Category:			
Session	^	Basic options for your PuTTY set	ssion
		Specify the destination you want to connec	ct to
Keyboard		Host Name (or IP address)	Port
Bell		18.144.41.19	22
Features ⊡· Window		Connection type: ○ Ra <u>w</u> ○ <u>T</u> elnet ○ Rlo <u>gi</u> n ● <u>S</u> SH	l O Se <u>r</u> ial
		Load, save or delete a stored session Sav <u>e</u> d Sessions	
Colours		Default Settings	<u>L</u> oad
Data			Sa <u>v</u> e
Telnet Rlogin			<u>D</u> elete
SSH			
Kex Host keys Ciober		Close window on e <u>x</u> it: ○ Always ○ Never ● Only on cl	ean exit
	~		
<u>A</u> bout	<u>H</u> elp	<u>O</u> pen	<u>C</u> ancel

3. To accept the host key, click **Yes**.

PuTTY Security Alert						
The hav thin The ssh- ce:2 If yo PuT If yo add If yo con	erver's host key is no no guarantee that th c it is. ed25519 255 l:f3:de:0b:65:6c:67:ef: u trust this host, hit Y Y's cache and carry on u want to carry on co ng the key to the cac u do not trust this ho nection.	ot cached in the re he server is the co key fingerprint is: b5:62:59:a2:a9:8b of connecting. n connecting. nnecting just onc he, hit No. ost, hit Cancel to a	gistry. You mputer you :70 to e, without ibandon the			
<u>Y</u> es	No	Cancel	Help			



4. For the login name, enter: ec2-user.



The authentication is completed with the public key.



Storage Repository

This section provides instructions for creating a storage repository for storing block devices that will be presented from the virtual machine.

1. Verify that the second volume attached to the virtual machine exists by running the following command:

sudo fdisk -l

```
ec2-user@ip-172-31-24-72:~
                                                                             \Box
                                                                                    \times
[ec2-user@ip-172-31-24-72 ~]$ sudo fdisk -1
Disk /dev/xvda: 8 GiB, 8589934592 bytes, 16777216 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disklabel type: gpt
Disk identifier: 33E98A7E-CCDF-4AF7-8A35-DA18E704CDD4
                         End Sectors Size Type
Device
             Start
/dev/xvdal 4096 16777182 16773087
                                         8G Linux filesystem
/dev/xvda128 2048
                        4095
                                         1M BIOS boot
                                  2048
Partition table entries are not in disk order.
Disk /dev/xvdf: 100 GiB, 107374182400 bytes, 209715200 sectors
Units: secons of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 by
             logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
[ec2-user@ip-172-31-24-72 ~]$
```

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2. Create a partition on the volume by running the following command:

sudo fdisk /dev/xvdf

- 3. Create a partition that fills up the entire volume:
 - a. On the fdisk main menu, enter: n
 - b. For Partition type, enter: p
 - c. For Partition number, enter: 1
 - d. To accept default of 2048 for the first sector, press Enter.
 - e. To accept default of max for the last sector, press Enter.

ec2-user@ip-172-31-24-72:~

```
Units: sectors of 1 * 512 = 512 bytes
                                                                                  \mathbf{A}
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
[ec2-user@ip-172-31-24-72 ~]$ sudo fdisk /dev/xvdf
Welcome to fdisk (util-linux 2.30.2).
Changes will remain in memory only, until you decide to write them.
Be careful before using the write command.
Device does not contain a recognized partition table.
Created a new DOS disklabel with disk identifier 0x9a9fbbf3.
Command (m for help): n
Partition type
      primary (0 primary, 0 extended, 4 free)
   q
      extended (container for logical partitions)
Select (default p): p
Partition number (1-4, default 1): 1
First sector (2048-209715199, default 2048):
Last sector, +sectors or +size{K,M,G,T,P} (2048-209715199, default 209715199):
Created a new partition 1 of type 'Linux' and of size 100 GiB.
Command (m for help):
```

4. To verify the new partition, enter **p**.

```
Command (m for help): p

Disk /dev/xvdf: 100 GiB, 107374182400 bytes, 209715200 sectors

Units: sectors of 1 * 512 = 512 bytes

Sector size (logical/physical): 512 bytes / 512 bytes

I/O size (minimum/optimal): 512 bytes / 512 bytes

Disklabel type: dos

Disk identifier: 0x9a9fbbf3

Device Boot Start End Sectors Size Id Type

/dev/xvdfl 2048 209715199 209713152 100G 83 Linux

Command (h for help):
```



5. To write changes and close fdisk, enter w.



6. To create a volume group on top of the new partition, run the following command:

sudo vgcreate VG quorums /dev/xvdf1



7. Within the new volume group, to create a logical volume that spans 100% of the volume group, run the following command:

sudo lvcreate -1 100 VG_quorums



8. To create an XFS file system on top of the logical volume, run the following command:

```
sudo mkfs.xfs /dev/VG_quorums/lvol0
```

Pec2-us	er@ip-172-31-24-72:~			—		\times
[ec2-use	r@ip-172-31-24-72 ~]\$ su	do mkfs.xfs /	dev/VG_quorums/lvol0			^
meta-dat	a=/dev/VG_quorums/lvol0	isize=512	agcount=4, agsize=25	5600 b	lks	
	=	sectsz=512	attr=2, projid32bit=	=1		
	=	crc=1	finobt=1, sparse=0			
data	=	bsize=4096	blocks=102400, imax	oct=25		
	=	sunit=0	swidth=0 blks			
naming	=version 2	bsize=4096	ascii-ci=0 ftype=1			
log	=internal log	bsize=4096	blocks=855, version=	=2		
	=	sectsz=512	sunit=0 blks, lazy-o	count=	=1	
realtime	=none	extsz=4096	blocks=0, rtextents=	=0		
[ec2-use	r@ip-172-31-24-72 ~]\$					

9. To make a mount point, run the following command:

sudo mkdir /quorums

10. To mount file system automatically during a reboot, add the following line in the /etc/fstab file:

/dev/VG_quorums/lvol0/quorums xfs defaults 0 0

11. Verify that the fstab addition works by running the following command:

sudo mount /quorums

df

					_		\times
[ec2-user@ip-172-31-24-72 ~]	\$ sudo mour	nt /quoru	ums				~
[ec2-user@ip-172-31-24-72 ~]	\$ df						
Filesystem	lK-blocks	Used	Available	Use%	Mounted	on	
devtmpfs	227596	0	227596	0%	/dev		
tmpfs	245624	0	245624	0%	/dev/shm	1	
tmpfs	245624	400	245224	1%	/run		
tmpfs	245624	0	245624	0%	/sys/fs/	cgroup	
/dev/xvdal	8376300	1264724	7111576	16%	1		
tmpfs	49128	0	49128	0%	/run/use	r/1000	
/dev/mapper/VG_quorums-lvol0	406180	21136	385044	6%	/quorums	;	
[ec2-user@ip-172-31-24-72 ~]	Ş						

Firewall Exemption

This section provides instructions for creating a firewall exemption so TCP traffic on port 3260 can enter the Virtual Private Cloud (VPC) where the virtual machine resides. Port 3260 is the default port used for iSCSI.

1. On the Instances page, select the virtual machine and click the security group attached to the instance.

AWS Services	s 🗸 Resourc	e Groups 🗸 👘	ک	UsersGroupAdmin/dLuong@hit 👻	N. California 👻 Support 👻
EC2 Dashboard	Launch Instan	ce 🔻 Connec	Actions 👻		∆ ↔ ♦ 0
Tags	Q Instance	State : Running 💿	Add filter		
Reports	Name	 Instance ID 	 Instance Type 	Availability Zone Instance St	ate - Status Checks - Alarm Sta
THE INCLUSION		i-0f05ca9c8	caa2a67e t2.nano	us-west-1a 🥥 running	2/2 checks None
Instances					
Launch Templates	4			0.00	+
Spot Requests	Instance: i-Of	05ca9c8caa2a67e	Public IP: 18.144.41.19		
Reserved Instances	Description	Status Checks	Monitoring Tags		
Dedicated Hosts		Instance ID	i 0f05ca9c8caa2a67o	Dublic DNS (IDu4)	100
Capacity		Instance ID	running	Public DNS (IPV4)	18 144 41 19
Reservations		Instance type	t2 nano	IPv6 IPs	-
IMAGES		Elastic IPs		Private DNS	ip-172-31-24-72.us-west-
AMIs					1.compute.internal
Bundle Tasks		Availability zone	us-west-1a	Private IPs	172.31.24.72
ELASTIC BLOCK STORE		Security groups	launch-wizard-3. view inbound	Secondary private IPs	
Volumes		Scheduled events	outbound rous No scheduled events	VPC ID	vpc-075201acbaecd164c



2. Select the Inbound tab and then click Edit.

aws ser	vices	∽ Resour	ce Groups 🗸 🔸		لِ UsersGroupAdr	nin/dLuong@hit 👻	N. California	ı v Suppor	t 🕶	
EC2 Dashboard		Create Securi	ty Group Actions 👻					∆ ≎	¢	0
Tags		Q Group ID	: sg-04af5b75235603bd7 💿 Add	filter			0 K <	1 to 1 of 1	> >	
Reports Limits		Name		*	Group Name	✓ VPC ID		- Owner		
			sg-04af5b75235603bd7		launch-wizard-3	vpc-075201ac	baecd164c	9814866	59064	
Instances		4								Þ
Launch Templates		Security Group	p: sg-04af5b75235603bd7		000					
Spot Requests Reserved Instances		Description	Inbound Outbound Ta	igs						
Dedicated Hosts Capacity Reservations	L	Edit								
IMAGES		Туре	Protocol (i)		Port Range ()	Source (j)	Des	scription (j)		
AMIs		SSH	TCP		22	0.0.0/0				
Bundle Tasks										

3. Click Add Rule.

- 4. Set the new rule.
 - a. For Type, select Custom TCP Rule.
 - b. For **Port Range**, type: **3260**
 - c. For Source, select Custom, and then enter the subnet of the storage system iSCSI ports.
 - d. For Description, type: iSCSI traffic

rpe (j)	Protocol (j)	Port Range (i)	Source (j)	Description (j)
SH 🔻	TCP	22	Custom • 0.0.0/0	e.g. SSH for Admin Desktop
Custom TCP F V	TCP	3260	Custom • 172.17.173.0/24	ISCSI traffic
dd Bulo				

5. Click Save. You do not need to create an outbound rule for TCP 3260.

Targetcli

Installation

This section provides instructions for installing targetcli on the virtual machine.

1. To install targetcli, run the following command:

sudo yum install -y targetcli

The following shows the output:

```
[ec2-user@ip-172-31-24-72 ~]$ sudo yum install -y targetcli
Loaded plugins: extras suggestions, langpacks, priorities, update-motd
Resolving Dependencies
--> Running transaction check
---> Package targetcli.noarch 0:2.1.fb46-6.amzn2 will be installed
--> Processing Dependency: python-rtslib >= 2.1.fb41 for package: targetcli-2.1.fb46-
6.amzn2.noarch
--> Processing Dependency: python-ethtool for package: targetcli-2.1.fb46-6.amzn2.noarch
--> Processing Dependency: python-configshell for package: targetcli-2.1.fb46-
6.amzn2.noarch
--> Running transaction check
---> Package python-configshell.noarch 1:1.1.fb23-4.amzn2 will be installed
--> Processing Dependency: python-urwid for package: 1:python-configshell-1.1.fb23-
4.amzn2.noarch
--> Processing Dependency: pyparsing for package: 1:python-configshell-1.1.fb23-
4.amzn2.noarch
---> Package python-ethtool.x86 64 0:0.8-5.amzn2.0.2 will be installed
--> Processing Dependency: libnl.so.1()(64bit) for package: python-ethtool-0.8-
5.amzn2.0.2.x86 64
---> Package python-rtslib.noarch 0:2.1.fb63-12.amzn2 will be installed
--> Processing Dependency: python-pyudev for package: python-rtslib-2.1.fb63-
12.amzn2.noarch
--> Processing Dependency: python-kmod for package: python-rtslib-2.1.fb63-12.amzn2.noarch
--> Running transaction check
---> Package libnl.x86_64 0:1.1.4-3.amzn2.0.2 will be installed
---> Package pyparsing.noarch 0:1.5.6-9.amzn2 will be installed
---> Package python-kmod.x86_64 0:0.9-4.amzn2.0.2 will be installed
---> Package python-pyudev.noarch 0:0.15-9.amzn2 will be installed
---> Package python-urwid.x86 64 0:1.1.1-3.amzn2.0.2 will be installed
--> Finished Dependency Resolution
```

Dependencies Resolved

Package	Arch	Version	Repository	Size
Installing:				
targetcli	noarch	2.1.fb46-6.amzn2	amzn2-core	67 k
Installing for depend	encies:			
libnl	x86 64	1.1.4-3.amzn2.0.2	amzn2-core	129 k
pyparsing	noarch	1.5.6-9.amzn2	amzn2-core	94 k
python-configshell	noarch	1:1.1.fb23-4.amzn2	amzn2-core	68 k
python-ethtool	x86 64	0.8-5.amzn2.0.2	amzn2-core	33 k
python-kmod	x86_64	0.9-4.amzn2.0.2	amzn2-core	74 k
python-pyudev	noarch	0.15-9.amzn2	amzn2-core	55 k
python-rtslib	noarch	2.1.fb63-12.amzn2	amzn2-core	100 k
python-urwid	x86_64	1.1.1-3.amzn2.0.2	amzn2-core	654 k
Transaction Summary				

-

Install 1 Package (+8 Dependent packages)

Total download size: 1.2 M

```
Installed size: 5.3 M
Downloading packages:
Downloading packages:94 kB00:00(1/9): pyparsing-1.5.6-9.amzn2.noarch.rpm94 kB00:00(2/9): libnl-1.1.4-3.amzn2.0.2.x86_64.rpm129 kB00:00(3/9): python-configshell-1.1.fb23-4.amzn2.noarch.rpm68 kB00:00(4/9): python-ethtool-0.8-5.amzn2.0.2.x86_64.rpm33 kB00:00(5/9): python-pyudev-0.15-9.amzn2.noarch.rpm55 kB00:00(6/9): python-kmod-0.9-4.amzn2.0.2.x86_64.rpm74 kB00:00(7/9): python-rtslib-2.1.fb63-12.amzn2.noarch.rpm100 kB00:00(8/9): python-urwid-1.1.1-3.amzn2.0.2.x86_64.rpm654 kB00:00(9/9): targetcli-2.1.fb46-6.amzn2.noarch.rpm67 kB00:00
3.5 MB/s | 1.2 MB 00:00
Total
Running transaction check
Running transaction test
Transaction test succeeded
Running transaction
  Installing : python-pyudev-0.15-9.amzn2.noarch
                                                                                             1/9
  Installing : pyparsing-1.5.6-9.amzn2.noarch
                                                                                             2/9
  Installing : python-kmod-0.9-4.amzn2.0.2.x86 64
                                                                                             3/9
  Installing : python-rtslib-2.1.fb63-12.amzn2.noarch
                                                                                             4/9
  Installing : libnl-1.1.4-3.amzn2.0.2.x86 64
                                                                                             5/9
  Installing : python-ethtool-0.8-5.amzn2.0.2.x86 64
                                                                                             6/9
  Installing : python-urwid-1.1.1-3.amzn2.0.2.x86 64
                                                                                             7/9
                                                                                            8/9
  Installing : 1:python-configshell-1.1.fb23-4.amzn2.noarch
                                                                                            9/9
  Installing : targetcli-2.1.fb46-6.amzn2.noarch
  Verifying : 1:python-configshell-1.1.fb23-4.amzn2.noarch
                                                                                            1/9
  Verifying : python-ethtool-0.8-5.amzn2.0.2.x86_64
                                                                                            2/9
  Verifying : python-urwid-1.1.1-3.amzn2.0.2.x86 64
                                                                                             3/9
  Verifying : python-rtslib-2.1.fb63-12.amzn2.noarch
                                                                                             4/9
  Verifying : libnl-1.1.4-3.amzn2.0.2.x86 64
                                                                                             5/9
  Verifying : python-kmod-0.9-4.amzn2.0.2.x86 64
                                                                                             6/9
  Verifying : pyparsing-1.5.6-9.amzn2.noarch
                                                                                             7/9
  Verifying : python-pyudev-0.15-9.amzn2.noarch
                                                                                             8/9
  Verifying : targetcli-2.1.fb46-6.amzn2.noarch
                                                                                             9/9
Installed:
  targetcli.noarch 0:2.1.fb46-6.amzn2
Dependency Installed:
  libnl.x86 64 0:1.1.4-3.amzn2.0.2
  pyparsing.noarch 0:1.5.6-9.amzn2
  python-configshell.noarch 1:1.1.fb23-4.amzn2
```

python-ethtool.x86_64 0:0.8-5.amzn2.0.2
python-kmod.x86_64 0:0.9-4.amzn2.0.2
python-pyudev.noarch 0:0.15-9.amzn2
python-rtslib.noarch 0:2.1.fb63-12.amzn2
python-urwid.x86 64 0:1.1.1-3.amzn2.0.2

Complete!

2. To install an additional python package that is required by targetcli, run the following command:

sudo yum install -y python-dbus

The following shows the output:

```
[ec2-user@ip-172-31-24-72 ~]$ sudo yum install -y python-dbus
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd
Resolving Dependencies
--> Running transaction check
---> Package dbus-python.x86_64 0:1.1.1-9.amzn2.0.2 will be installed
--> Processing Dependency: libdbus-glib-1.so.2()(64bit) for package: dbus-python-1.1.1-
9.amzn2.0.2.x86_64
--> Running transaction check
```

---> Package dbus-glib.x86_64 0:0.100-7.2.amzn2 will be installed --> Finished Dependency Resolution

Dependencies Resolved

Package	Arch	Version	Repository	Size
Installing: dbus-python Installing for dep	x86_64 endencies:	1.1.1-9.amzn2.0.2	amzn2-core	206 k
dbus-glib	x86_64	0.100-7.2.amzn2	amzn2-core	103 k
Transaction Summar	У 			
Install 1 Package	(+1 Depender	nt package)		
Total download siz Installed size: 1. Downloading packag (1/2): dbus-python	e: 309 k 1 M es: -1.1.1-9.amzr	n2.0.2.x86_64.rpm	206 kB	00:00
(2/2): dbus-glib-0	.100-7.2.amzr	12.x86_64.rpm	103 KB	
Total Running transactic Running transactic Transaction test s Running transactic Installing : dbu Installing : dbu Verifying : dbu Verifying : dbu	n check n test ucceeded n s-glib-0.100- s-python-1.1. s-python-1.1. s-glib-0.100-	-7.2.amzn2.x86_64 1-9.amzn2.0.2.x86_64 1-9.amzn2.0.2.x86_64 -7.2.amzn2.x86_64	1.8 MB/s 309 kB	00:00 1/2 2/2 1/2 2/2
Installed: dbus-python.x86_	64 0:1.1.1-9.	_ .amzn2.0.2		
Dependency Install dbus-glib.x86_64	ed: 0:0.100-7.2.	.amzn2		

Complete!

3. To start the targetcli daemon, run the following command:

sudo systemctl start target

4. To verify that the daemon is running, run the following command:

sudo systemctl status target

🧬 ec2-user@ip-172-31-24-72:~	_		×
<pre>[ec2-user@ip-172-31-24-72 ~]\$ sudo systemctl status target • target.service - Restore LIO kernel target configuration Loaded: loaded (/usr/lib/systemd/system/target service: enabled</pre>	• vend	lor pre	A
t: disabled)	, venu	or pro	
Active: active (exited) since Thu 2019-10-10 23:45:19 UTC; 10s Process: 559 ExecStart=/usr/bin/targetctl restore (code=exited,	ago status	=0/SUC	CE
SS)			
Main PID: 559 (code=exited, status=0/SUCCESS)			
Oct 10 23:45:19 ip-172-31-24-72.us-west-1.compute.internal systemd	[1]: S	Starti.	• •
Oct 10 23:45:19 ip-172-31-24-72.us-west-1.compute.internal systemd	[1]: S	starte.	•••
[ec2-user@ip-172-31-24-72 ~]\$			

5. To set targetcli to start automatically after it restarts, run the following command:

sudo systemctl enable target



Configuration

This section provides instructions for configuring targetcli to serve three 13 GB volumes over iSCSI.

1. Log in to targetcli by running the following command:

```
sudo targetcli
```



2. Create three 13 GB volumes in the /quorums folder as follows:

```
a. Create volume 1 by running the following command:
backstores/fileio create volume1 /quorums/volume1 13G
The following shows the output:
Created fileio volume1 with size 13958643712
b. Create volume 2 by running the following command:
backstores/fileio create volume2 /quorums/volume2 13G
The following shows the output:
```

Created fileio volume2 with size 13958643712

c. Create volume 3 by running the following command:

backstores/fileio create volume3 /quorums/volume3 13G

The following shows the output:

Created fileio volume3 with size 13958643712

3. To create an iSCSI qualified name, run the following commands:

cd /iscsi

create

The following shows the output:

```
Created target iqn.2003-01.org.linux-iscsi.ip-172-31-24-72.x8664:sn.a375a63a681c. Created TPG 1.
Global pref auto_add_default_portal=true
Created default portal listening on all IPs (0.0.0.0), port 3260.
```

4. Change the listening IP address from all to one specific IP address.

a. Change the directory by running the following command:

cd iqn.2003-01.org.linux-iscsi.ip- 172-31-24-72.x8664:sn.a375a63a681c/tpg1/portals/

b. Delete listening on all IP addresses by running the following command:

delete 0.0.0.0 3260

The following shows the output:

Deleted network portal 0.0.0.3260

c. Set up listening on one specific IP address by running the following command:

create 172.31.24.72 3260

The following shows the output:

Using default IP port 3260 Created network portal 172.31.24.72:3260.

5. Map the volumes that you created earlier.

a. Change the directory by running the following command:

cd /iscsi/iqn.2003- 01.org.linux-iscsi.ip-172-31-24-72.x8664:sn.a375a63a681c/tpg1/luns

b. Map the first LUN by running the following command:

create /backstores/fileio/volume1

The following shows the output:

Created LUN 0.

c. Map the second LUN by running the following command:

create /backstores/fileio/volume2

The following shows the output:

Created LUN 1.

d. Map the third LUN by running the following command:

create /backstores/fileio/volume3/

The following shows the output:

Created LUN 2.

6. Mask the initiator IQNs of the storage systems to allow access to the LUNs. This adds four IQNs: two ports from each storage system.

a. Change the directory by running the following command:

```
cd /iscsi/iqn.2003-01.org.linux-iscsi.ip-172-31-24-72.x8664:sn.a375a63a681c/tpg1/acls
```

b. Create the first IQN by running the following command (your IQN will be different):

create iqn.1994-04.jp.co.hitachi:rsd.h8m.i.123ac6.1a

The following shows an example of the output:

```
Created Node ACL for iqn.1994-04.jp.co.hitachi:rsd.h8m.i.123ac6.1a
Created mapped LUN 2.
Created mapped LUN 1.
Created mapped LUN 0.
```

c. Create the second IQN by running the following command (your IQN will be different):

create iqn.1994-04.jp.co.hitachi:rsd.h8m.i.123ac6.2a

The following shows an example of the output:

```
Created Node ACL for iqn.1994-04.jp.co.hitachi:rsd.h8m.i.123ac6.2a
Created mapped LUN 2.
Created mapped LUN 1.
Created mapped LUN 0.
```

d. Create the third IQN by running the following command (your IQN will be different):

create iqn.1994-04.jp.co.hitachi:rsd.h8m.i.12afcd.1a

The following shows an example of the output:

```
Created Node ACL for iqn.1994-04.jp.co.hitachi:rsd.h8m.i.12afcd.1a
Created mapped LUN 2.
Created mapped LUN 1.
Created mapped LUN 0.
```

e. Create the fourth IQN by running the following command (your IQN will be different):

create iqn.1994-04.jp.co.hitachi:rsd.h8m.i.12afcd.2a

The following shows an example of the output:

```
Created Node ACL for iqn.1994-04.jp.co.hitachi:rsd.h8m.i.12afcd.2a
Created mapped LUN 2.
Created mapped LUN 1.
Created mapped LUN 0.
```

7. To save the changes, run the following command:

cd /

saveconfig

The following shows the output:

```
Last 10 configs saved in /etc/target/backup/. Configuration saved to /etc/target/saveconfig.json
```

8. To view the completed configuration, run the following command:

ls

The following is an example of the output (your URL for the LUNs will be different):

0-	/ []
0	- backstores []
- 1	o- block
- 1	o- fileio
- 1	o- volume1 [/quorums/volume1 (13.0GiB) write-back activated
- 1	o- alua
- 1	o- default_tg_pt_gp [ALUA state: Active/optimized]
- 1	o- volume2 [/quorums/volume2 (13.0GiB) write-back activated]

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```
| | | o- default tg pt gp ..... [ALUA state: Active/optimized]
 | | o- volume3 ..... [/quorums/volume3 (13.0GiB) write-back activated]
 | o- ramdisk ...... [Storage Objects: 0]
 o-iqn.2003-01.org.linux-iscsi.ip-172-31-24-72.x8664:sn.a375a63a681c [TPGs:
                                             1]
   o- tpg1 ..... [no-gen-acls, no-auth]
    | o- iqn.1994-04.jp.co.hitachi:rsd.h8m.i.123ac6.1a .... [Mapped LUNs: 3]
    | | o- mapped lun0 ..... [lun0 fileio/volume1 (rw)]
    | | o- mapped lun1 ..... [lun1 fileio/volume2 (rw)]
    | | o- mapped lun2 ..... [lun2 fileio/volume3 (rw)]
    | o- iqn.1994-04.jp.co.hitachi:rsd.h8m.i.123ac6.2a .... [Mapped LUNs: 3]
    | | o- mapped lun0 ..... [lun0 fileio/volume1 (rw)]
    | | o- mapped_lun1 ..... [lun1 fileio/volume2 (rw)]
    | | o- mapped lun2 ..... [lun2 fileio/volume3 (rw)]
    | o- iqn.1994-04.jp.co.hitachi:rsd.h8m.i.12afcd.1a .... [Mapped LUNs: 3]
    | | o- mapped_lun0 ..... [lun0 fileio/volume1 (rw)]
    | | o- mapped_lun1 ..... [lun1 fileio/volume2 (rw)]
    | | o- mapped lun2 ..... [lun2 fileio/volume3 (rw)]
    | o- iqn.1994-04.jp.co.hitachi:rsd.h8m.i.12afcd.2a .... [Mapped LUNs: 3]
      o- mapped lun0 ..... [lun0 fileio/volume1 (rw)]
      o- mapped lun1 ..... [lun1 fileio/volume2 (rw)]
      o- mapped lun2 ..... [lun2 fileio/volume3 (rw)]
    | o- lun0 ...... [fileio/volume1 (/quorums/volume1) (default tg pt qp)]
    | o- lun1 ...... [fileio/volume2 (/quorums/volume2) (default tg pt gp)]
    | o- lun2 ...... [fileio/volume3 (/quorums/volume3) (default tq pt qp)]
    />
```

After successfully setting up the virtual machine as an iSCSI target, you must secure the solution by removing the public IP.

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 Fibre 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.

Hitachi Device Manage	ľ Storage Naviga Reports Setting	tor 5 Maintenance Utility	View Tool	Help	Alert	E Audit Log	Operation Unlocke	d Logged in as:	dluong	HITACH Logout
Explorer	External Stora	ge						Last Updated : 20	19/10/11 10:	38 🖏 ?
Storage Systems	SISF700-140(S/M	1:415046) > External Sto	orage							
T SISF700-140(S/N:415046)	Number of Ext	ernal Storage Systems	0		Nur	nber of External Volun	nes	0		
😭 Tasks	Number of Ext	ernal Paths	0		E×t	ernal Volume Capacity		0.00 MB		
😭 Reports	Number of iSC	SI Paths	0							
🐂 Components					^					
👫 Parity Groups	External Stor	age Systems Exter	nal Paths iSCS	I Paths						
🎁 Logical Devices	Add iSCSI Pa	ths Edit iSCSI Target	s Delete iSCSI P	ati More Actic	ns V				Selected:	0 of 0
* 隆 Pools							ſ	0-11		
Marts/Host Groups/iSCS	XFilter ON	OFF Select All Page	s Column Settings				L	Options V Jue	1 /1	
* 🎆 External Storage	Local			Remote						
ি Replication	Port ID	Virtual Port ID	CHAP User Name	IP Address	TCP Port Number	iSCSI Target Name	Authentication Method	Mutual CHAP	CHAP User Name	used

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

Add iSCSI Paths			III AL SUITAILE							Last OU	Jateo : 2019/10/	ŦΟΧ			
1.Add iSCSI Paths >		nfirm													
This wizard lets you add	i iscr	ŝI paths. To (discover available iSCSI pa	aths, Click Discover iS	3CSI Targets. F	inter the iSCSI	path s	settings, an	d then click Add. Click Finis	h to confirm.					
iSCSI Targets:		Discover iSCS	I Targets				Selected iSCSI Paths								
l	1	vailable i	2 Paths				Se	lect All Page	es						
l	\$	Filter ON	Oh Select All Pages	Options 🗸 💽 🗲	1 / 1			Local		Remote					
		Local		Remote				Port ID	Virtual Port ID	IP Address	TCP Port	iSCSI Target			
		Port ID	Virtual Port ID	IP Address	TCP Port Number						Number	Name			
			No Da	ata											
						Add 🕨			N	o Data					

- 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 AWS virtual machine.
 - c. For Remote TCP Port Number, enter 3260.



d. Click Add.

inter the required information	to discover the iSCSI paths. Cli	ck Add to add the discovery	targets, and then di	:k ок						
_ocal Port ID:	CL2-A		•	D	iscovery L	ist		_	-	
.ocal Virtual Port ID:					Select All Pages					
Remote IP Address:	IPu4 IPu6				Local		Remote			
	172.31.24.72	<u> </u>			Port ID	Virtual Port ID	IP Address	TCP Port Number		
				\checkmark	CL2-A	+	172.31.24.72	3260		
≀emote TCP Port Number:	3260 (1-65535)	2			CL1-A	- - - - - - - -	172.31.24.72	3260		
			Add 🕨							

- 6. After creating both iSCSI paths, click OK.
- 7. On the Add iSCSI Paths window, set the following:
 - a. From the Authentication Method dropdown list, click None.
 - b. For Mutual CHAP, click Disable.

Authentication Method:	None 🛛
Mutual CHAP:	🔵 Enable 💿 Disable
User Name:	
	(-)
Secret:	
	(-)

8. Click Add and then click Finish.

		paths. To di-	iscover available iSCSI path	hs, Click Discover i	ISCSI Targets. F	nter the iSCSI path	settin	gs, an	d then click Add. Click Fi	hish to confirm.		
CSI Targets:	Di	scover iSCSI	Targets			5	Select	ted iS	CSI Paths			_
	Av	ailable iSC	SI Paths			Se	elect A	I Page	15			
E CONTRACTOR OF CONTRACTOR OFO	\$F	ilter ON	Select All Pages 0	options 🗸 🕅 🗧	1 / 1		Loc	al		Remote		
		Local		Remote		v	Port	t ID	Virtual Port ID	IP Address	TCP Port Number	iSCSI Targe
L	-	Port ID	Virtual Port ID	IP Address	TCP Port Number		CL2	2-A	1	172.31.24.72	3260	iqn.2003-0
						V	CL1	L-A		172.31.24.72	3260	iqn.2003-0
	-											
	¢											
			No Da	ta	_							
	4		No Da	ca					-			

The following shows the created paths:

Cogical Devices	A	dd iscsI Path	hs Edit ISCSI Targets	Delete ISCSI P	aths More Action:					Selected:	0 of
Pools	2	Filter ON	OFF Select All Page	Column Settings				(Options 🖝 🕅 🗧	1 /	1 >
* M External Storage		Local			Remote						
Replication		Port ID	Virtual Port ID	CHAP User Name	IP Address	TCP Port Number	iSCSI Target Name	Authentication Method	Mutual CHAP	CHAP Use Name	Us
		CL1-A			172.31.24.72	3260	iqn.2003-01	None	Disabled		Ne
		CL2-A			172.31.24.72	3260	iqn.2003-01	None	Disabled		Ne

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.

Hitachi Device Manage	f Storage Navigator					HITACH
File Actions I	Reports Settings Maintenance Utility	View Tool He	lp 💽	Alert 🖡 Audit Log 🔗 Operation Lock	ed Logged in as: dluong	Logout
Explorer	External Storage				Last Updated : 2019/10/11 12:4	• • •
Storage Systems	<u>SISF700-140(S/N:415046)</u> > External Storag	e				
SISF700-140(S/N:415046)	Number of External Storage Systems	0		Number of External Volumes	0	
🛍 Tasks	Number of External Paths	0		External Volume Capacity	0.00 MB	
🌈 Reports	Number of iSCSI Paths	0				
🎢 Components						
👫 Parity Groups	External Storage Systems External	Paths iSCSI Pa	iths			
Cogical Devices	Add External Volumes Disconnect Exte	rnal Storage System	Beconnect External	Storage Systems More Actions	Selected: C	of 0
* 隆 Pools						
Ports/Host Groups/iSCS	XFliter On F Select All Pages C	olumn settings				
🆓 External Storage	Vendor / Model Serial Number	Status	Number of External Path Groups			
隆 Replication						

2. Click Create External Path Group.

Ext	ernal Volumes								TO
elect			Add External						
is viz lect r	ard lets you virtua external path grou	lize storag ps to map	e resources b paths betwee	by mapping external volu an external and local sys	umes to the local storage sy tems, or click Create Externa	stem. al Path Group to add a new group. Click Ne	xt to add external volumes.		
d Ext	ternal Volumes:								
By	Nev External Path	Group:							
1	Create External	Path Group							
	External Path	o ID:	Select from	[Create External Path G	roup]				
Byf	Existing External P	ath Goup:							
A	vailable Extern	al Path G	roups						
*	Filter ON OFF						Options 🐨	(0) 0 1	/1
	External Path	Tune	External P	ath(Highest Priority)			Vendor / Model / Serial Number	Number	
		1.2.8-4					Address history and the second second		

3. Click Discover External Target Ports.

initial External Pa External Paths:	th Group ID:	0 (0-63231) Discover External Ta	arget Ports									
External Stora Available I	ge System: External Pa	ths				Se	elected E:	kternal Pati	hs	_	_	
2 Filter ON	OFF Se	lect All Pages Option	External	/1 [*]		[Set	ect All Pag	43)			External	
Port ID	Туре	Virtual Port ID	IP Address	WWN / ISCSI	Add 🕨		Priority	Port ID	Type	Virtual Port ID	IP Address	3
		No Dat	8		4 Remove	Ĵ			No	o Data		
												ļ



4. Select the iSCSI ports, click Add, and then click OK.

Exter	nal Ports:													
Av	ailable E	xternal P	orts					0	S	elected Ex	kternal Po	orts		
¢₽i	lter ON	OFF	elect All Pages	Options 👻	₩ € 1	/1 🦻	H		Sel	lect All Page	es			
	Port ID	Type					1		\checkmark	Port ID	Туре			_
	CL3-A	ISCSI					11			CL1-A	iscsi			
	CL1-E	Fibre							1	CL2-A	iscsI			
	CL3-E	Fibre							າ		1	2		
	CL5-E	Fibre						Add p						
	CL7-E	Fibre												
	CL1-F	Fibre						Remove						
	CL3-F	Fibre										_		
	CL5-F	Fibre												
	CL7-F	Fibre												
	CL4-A	ISCSI												
	CL2-E	Fibre												
1	CL4-E	Fibre					~							

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

initial E ixterna	ixternal Pat	n Group ID:	0 (0-63231) Discover Externa	al Target Ports									
Exte	ernal Storag vailable E	e System: xternal Pa	LIO-ORG / (g	eneric) /			S	elected E	xternal Pati	hs			_
*	Filter ON	OFF Se	lect All Pages O	ptions 🗸 🕅 🔥 1	/1 > 🛞		Se	lect All Pag	es				
	Port ID	Tupe	Virtual Port ID	External				Priority	Port ID	Type	Virtual Port ID	External	
100	POINTD	17pe	sinces Port 10	IP Address	WWN / ISCSI							IP Address	3
	CL1-A	iscsi		172.31.24.72	iqn.2003-01.	Add 🕨							
	CL2-A	ISCSI	-	172.31.24.72	iqn.2003-01.					D.L.	Data		
						Remove				110	Data		
							-						
< 6					 ,		< 0		V				>

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

tial External Path ternal Paths:	Group ID:	0 (0-63231) Discover External T	arget Ports							
External Storag Available E:	e System: kternal Pa	LIO-ORG / (gene aths	rric)/ ▼	/1 33		Selecte Select All	d External Pat Pages	hs	_	_
Port ID	Type	Virtual Port ID	External IP Address	www./iscsi		Priori	1▲ Port ID	Type	Virtual Port ID	External IP Address
		No Dat	а		Add >	⊻ ≥	1 CL1-A 2 CL2-A	iscsI iscsI	•	172.31.24.72 172.31.24.72
<			Sele	cted: 0 of 0		< Contract Raise P	riority Lower	Priority		Selected: 2 of 2



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

			Coloria d Estavo al	11-1			_
External Volumes:		le le	Selected External	volumes			Ontions
Discovered External Volumes	Options ▼ 1€ € 1 / 1 → Э	2	LUN ID (Highest Priority)	Device Name	Volume Properties	Device ID	Drive Info
LUN ID (Highest Device Name	Capacity Volume Device ID Drive I	5	✓ 0	volume1	0000	6001405D86	
	No Data	2	1	volume2	0001	60014059C1	
		2	2	volume3	0002	60014055F75	
<	· · · · · · · · · · · · · · · · · · ·	_					
	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)	kdd ▶					
☆ Options							
Initial LDEV ID:	LDKC CU DEV						
	00 : 00 • : 00 •						
	Interval						
	0 View LDEV IDs	-					
Number of LDEVs	1						
per External Volume:	(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)						

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

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

Hitachi Device Manage	f Storage Navigator Leports Settings Maintenance Utility \	/iew Tool Help	Alert 🖡 Audit Log 🏾 Operation Union	ked Logged in as: dluong Loggut
Explorer	EPathGroup0			Last Updated : 2019/10/11 15:01 🚯 ?
Storage Systems	SISF700-140(S/N:415046) > External Storage	> LIO-ORG / (generic) / > EPathGroup		
SISF700-140(S/N:415046)	Status	Normal	Number of External Volumes	3
Marks 🎬 Reports	Vendor / Model / Serial Number Number of External Paths	LIO-ORG / (generic) / 2 (Max Allowed: 8)	External Volume Capacity	39.00 GB
* 🎁 Components * 🌾 Parity Groups	Mapped Volumes External Paths		<u>.</u>	
Cogical Devices	Add External Volumes Edit External Vol	umes View External LUN Properties	More Actions	Selected: 0 of 3
Pools	Select All Pages Co	olumn Settings		Options
* M External Storage	Group ID Status Top LI	DEV ID Top LDEV Device Name	Number Capacity Volume Properties	Device ID Drive Info MP Ur
* 🚮 LIO-ORG / (generi	🔲 🏟 <u>E1-1</u> 🥥 Normal 00:00	:40 volume1	1 13.00 GB 0000	6001405D86 MPU-:
👯 EPathGroup0	🔲 📦 E1-2 🥥 Normal 00:00	:41 volume2	1 13.00 GB 0001	60014059C1 MPU-:
' 🙀 Replication		:42 volume3	1 13.00 GB 0002	60014055F75 MPU-:

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 Fibre 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.

	File	Actions	Reports Set	vigator tings Mainte	nance Utility Vie	w Tool Help		۲	Alert 🔒 Audi	t Log 1 2 De	eration Unlocked	Logged in as: dl	uong L
nlr	nrer		Remote Co	nnections							Las	t Updated : 201	9/10/11 15:03 🐔
d (Quorum Disks												T
١dc	d Quorum Disks												
his	wizard lets you	add quorum	disks. Select LD	EVs from the Av	ilable LDEVs list,se	lect a remote stora	ge system, and t	hen c	lick Add. Click Fir	ish to confirm.		_	
uo	rum Disk ID:		01					s	elected Ouoru	n Dicks	_	_	_
	Add Ouorum Disl	without LDE	.v					Se	lect All Pages				Options
A	vailable LDEVs								Quorum Disk	Quorum Disk			
¢ F	ilter ON OFF			Optic	ns 🔻 🗲 1	/1 ≯≫)		~	ID	LDEV ID	LDEV Name	CLPR	Capacity
I	LDEV ID	LDEV	CLPR	Capacity				✓	00	00:00:40		0:CLPR0	13.00 GB
5	00:00:41	marrie	0:CLPR0	13.00 GB									
5	00:00:42		0:CLPR0	13.00 GB									
ł													
I													
							Add 🕨						
4													
						Total: 2							
1													
em	note Storage Sys	tem:	Model	/ Serial Number									
			VSP	G×00 and VSP F:	:00 / 445005								

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



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							
SFilter ON OFF Select All Pages Column Settings						Options 🔻 🗲 🗲	1 /1 →→
Quorum Disk ID	Quorum Disk					Designed Stations Southers	Read Response Gua
	LDEV ID	LDEV Name	Status	CLPR	Capacity	Keniote storage system	(sec)
🧿 oo 🛌	00:00:40		🔵 Normal	0:CLPR0	13.00 GB	VSP Gx00 and VSP Fx00 / 445005	
	Ad Quorum Disks Filter ON OFF Quorum Disk ID 00	hections (To) Connections (Id Quorum Disks Remove Quor Filter ON OFF Select All Page Quorum Disk ID Quorum Disk LDEV ID 00:00:40	Acctions (To) Connections (From) Quoru Id Quorum Disks Remove Quorum Disks Edit Filter ON OFF Select All Pages Column Settin Quorum Disk Quorum Disk LDEV ID LDEV Name 00 00:00:40 D	Acctions (To) Connections (From) Quorum Disks Id Quorum Disks Remove Quorum Disks Edit Quorum Disks Filter ON OFF Select All Pages Column Settings Quorum Disk Quorum Disk LDEV ID LDEV Name 00 00:00:40 Normal	Acctions (To) Connections (From) Quorum Disks Id Quorum Disks Remove Quorum Disks Edit Quorum Disks Export Filter ON OFF Select All Pages Column Settings Quorum Disk ID UDEV ID LDEV Name Status CLPR 00 00:00:40 OrcLPR0	Acctions (To) Connections (From) Quorum Disks Id Quorum Disks Remove Quorum Disks Edit Quorum Disks Export Filter ON OFF Select All Pages Column Settings Quorum Disk Quorum Disk LDEV ID LDEV Name Status CLPR Capacity 00 00:00:40 O:CLPR0 13:00 GB	Acctions (To) Connections (From) Quorum Disks Id Quorum Disks Remove Quorum Disks Edit Quorum Disks Export Quorum Disk Select All Pages Column Settings Options ▼ (€) Quorum Disk Quorum Disk LDEV ID LDEV Name Status CLPR Capacity 00 00:00:40 Normal 0:CLPR0 13.00 GB VSP Gx00 and VSP Fx00 / 445005