

# VMware vSphere Virtual Volumes (vVols) with Hitachi Virtual Storage Platform

Quick Start and Reference Guide

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# VMware vSphere Virtual Volumes (vVols) with Hitachi Virtual Storage Platform

### Quick Start and Reference Guide

This is a quick start guide for existing Hitachi Virtual Storage Platform (VSP) customers to set up their first VMware vSphere virtual volumes (vVols) environment.

This document describes the steps required to set up a vVols environment. The document assumes a greenfield environment with part 1 focusing on storage administrator actions, and part 2 for vSphere administrators. The vSphere administrator can skip to "Part 2. VMware vSphere Administrator – Set up Hitachi Storage Provider for VMware vCenter" on page 13.

Figure 1 shows the vVols architecture with Hitachi VSP series.

#### Figure 1



The Hitachi Storage Provider for VMware vCenter (VASA Provider) is deployed as an appliance virtual machine, similar to a vCenter or NSX appliance, into a management cluster. A single Hitachi VASA appliance can manage multiple arrays and connect with multiple vCenters to reduce management overhead.

The following are the prerequisites for a for a VMware vSphere vVols setup:

- Physical or VM-based SVP storage management node.
- Preferably a separate or a shared storage resource group. A meta resource group can also be used. (although a meta resource group can be used).

- One or more new or existing parity groups for HDP/HDT pools.
- One or more new or existing HDP/HDT pools.
- An HTI pool, for snapshots or clones, if using HDT pools.
- A dedicated storage user account with admin privileges.
- IP address/FQDN for Hitachi Storage Provider for VMware vCenter.

This is an outline of the high-level procedure:



## Part 1. Prepare Storage

To prepare storage for vVols, the storage administrators must run these procedures. Administrators can create a separate dedicated resource group for vVols or they can use the default resource group meta\_resource. The next steps is to create and present a PE/ALU to ESXi hosts. Note that both vVols and VMFS datastores can share the same resource group.

If resource group is already created, you can skip to "Step 4. Create a Protocol Endpoint and Add it to ESXi Hosts" on page 11

The resource group for vVols contains the following:

- One or more dedicated dynamic pools (storage pools using HDP and/or HDT).
  - Dynamic provisioning pools cannot be shared with different resource groups.
  - LDEVs for vVols and LDEVs for VMFS datastores can co-exist in the same pool.
- An optional Hitachi Thin Image pool
  - If no Thin Image pool is added to the resource group, then the vVol snapshot images will be stored in the dynamic provisioning pool.
- LDEV IDs reserved for future vVols creation.

## Step 1. Create Storage Pools

Log in to Hitachi Device Manager Storage Navigator. After entering the IP address of the Hitachi Virtual storage Platform (SVP) in the browser, you need to change the ending URL from index.do to emergency.do as shown in the following figure. You can create a dedicated storage pool for vVols or reuse an existing storage pool. To create a new pool, click **Create Pools**.

1. Log in to the Hitachi Device Manager Storage Navigator.

After you enter the IP address of the SVP in the browser, change the ending URL from index.do to emergency.do, as shown in the following figure. You can create a dedicated storage pool for vVols or reuse an existing storage pool.

2. Click **Create Pools** to create a new pool.

$\leftrightarrow$ $\rightarrow$ C (i) Not secure   172	.25.47.112/sanpro	ojec /emergency.do				
Hitachi Device Manager st	orage Navigator s Settings Vie	ew Tool Help				
Explorer	Pools					
Storage Systems	R900 NVMe ASE-4	47.112 G10(S/N:30595) >	Pools			
R900_NVMe ASE-47.112 G10(S/N:3)	Edit Tiering Pol	icies				
12 Tasks			Dynar	mic Provisioning (I	DP)	
C Reports	Pool Capacity	Used/Total	441.4	5 GB / 9.97 TB		
' 💏 Components			[4 %]			
' 👫 Parity Groups	Estimated Configurable			4495.62 TB		
Cogical Devices	V-VOL Capacity	16.00	16.00 TB / 16.00 TB			
🕈 🔂 Pools			[100 9	9%]		
Gold-NVMe-RAID6-Pool(0)		Estimated Configura	able 4489.	09 TB		
Silver-10k-External-Pool(1)	Licensed Capacity (Used/Licensed)			9.97 TB / Unlimited		
Ports/Host Groups/iSCSI Target	Number of Pools	5	2 (Ma	2 (Max Allowed: 128)		
) 🎆 External Storage	Pools				^	
• 👘 Replication	Create Pools	Create LDEVs Expa	nd Pool More A	ctions 🔹		
	Filter ON	OFF Select All Page	s Column Settings			
۵ (	Pool Name	e Status	Number of Pool VOLs	Number of V- VOLs	Number of Root VOLs	
Analytics	Gold-N	VM ON Normal	4	10	0	
Administration	Silver-	10 🔘 Normal	1	0	0	

- 3. Select **Dynamic Provisioning** for **Pool Type**.
- 4. Click **Select Pool VOLs** to select LDEVs to construct this storage pool.

In the following example a few basic LDEVs are already created from parity groups. Add these LDEV IDs to the resource group for vVols later.

5. Click **Finish** to create a pool.

Create Pools									TOX
1.Create Pools > 2.Confirm									
This wizard lets you create pools for D Click Finish to confirm the creation, o	Dynamic Provisioning, and Thin In or click Next if you want to create	mage. Enter the information for the pool yo LDEVs (virtual volumes) from the pools.	u want to create, and	d the	n click Add.	_	_	_	
Pool Type:	ynamic Provisioning			S	elected Pools	_	_	_	Ontions
System Type:   Multi-Tier Pool:	Open Mainframe				Pool Name (ID)	RAID Level	Capacity	Pool Type	Drive Type/RPM
Data Direct Mapping:	Active Flash Enable () Disable				Gold-NVMe-R	5(3D+1P)	5277.72 GB	DP	SSD,FMD/-
Pool Volume Selection:	Auto 💿 Manual								
Drive Type/RPM: RAID Level:	Mixable Mixable		Add 🕨						
Pool Name:	rated Compression for FMD parity old-NVMe-RAID5-pool ax. 32 Characters)	y group							
V Options									
				< 0	Detail Remove	•			> Selected: 0 of 1
			Next Task O	ption	: Continue to Crea	te LDEVs	d Back No	ext 👂 🛛 Fi	nish Cancel ?

Optionally you can create a Thin Image pool for VM-based snapshot images. This allows the snapshot images to be stored in a separate Thin Image pool rather than in the vVols storage pool that was already created.

Use the default pool to share the same pool for data and snapshots. Use a dedicated pool to manage the snapshots and data separately.

Create Pools										Ŧ□×
1.Create Pools > 2.Confirm										
This wizard lets you create poo Click Finish to confirm the crea	ols for Dynamic Prov ition, or click Next if	isioning, and Thin Image. you want to create LDEV:	Enter the information for the pool y s (virtual volumes) from the pools.	ou want to create, a	nd the	n click Add.				_
Pool Type:	Thin Image				s	elected Pools	_	_	_	
System Type:	Open	Mainframe			Se	lect All Pages				Options 🔻
Multi-Tier Pool:	Enable (	Disable				Pool Name (ID)	RAID Level	Capacity	Pool Type	Drive Type/RPM
	Active Flash					vVols-TI-pool	5(3D+1P)	5277.72 GB	TI	SSD,FMD/-
Data Direct Mapping:	🔵 Enable 🤇	Disable								
Pool Volume Selection:	🔵 Auto 💿	Manual								
Drive Type/ RAID Level	'RPM: :	Mixable Mixable	Select Prol VOIs							
		То	tal Selected Pool Volumes: Total Selected Capacity:	Add	4					
Enable	Accelerated Compre	ssion for FMD parity grou	P							
Pool Name:	vVols-TI-pool (Max. 32 Charac	ters)								
V Options										
					< (	Detail Remov	e			> Selected: 0 of 1
L				Next Task (	Option	: Continue to Crea	te LDEVs	∉ Back Ne	ext ) Fi	nish Cancel ?

## Step 2. Create a Resource Group

You can skip this step if are using the **meta\_resource** group or an existing resource group.

1. To create a dedicated resource group for vVols, click Create Resource Groups.

Hitachi Device Manag	<b>er</b> Storage Navigator			
File Actions	Reports Settings View	Tool Help		
Explorer	Resource Groups			
Storage Systems	Resource Groups			
Analytics	Number of Resource Groups	;		
Administration				
🕅 🕅 User Groups	Resource Groups	•		
Resource Groups	Create Resource Groups	Edit Resource Gr	oup Delete Reso	ource Groups
Cache Partitions	Filter ON OFF	Select All Pages Co	lumn Settings	
License Keys	Resource Group Name	Number of User Groups	Number of Parity Groups	Number of LDEVs
	HDIDProvisio	7	0	0
	Marta resource	9	4	65280

#### 2. Click **Select LDEVs** to add LDEVs into this resource group.

Create Resource Groups		_
1.Create Resource Groups > 2.Confirm		
This wizard lets you create resource groups. Click each button to select parity groups, LDEVs, ports, host groups and iSCSI	targe	ts to be added to the re
Resource Group Name:	Se	elected Resource (
(Max, 32 Characters)	Sele	ect All Pages
Parity Group Selection:		Resource Group Name (ID)
Select Parity Groups		
Total Selected Parity Groups: 0		
LDEV Selection:		
Select LDEVs		
Total Selected LDEVs: 0		
Port Selection:		
Select Ports		
Total Selected Ports: 0		

3. Add all the LDEVs that are associated to the storage pools.

This ensures that Hitachi Storage Provider for VMware vCenter uses only these pools in this resource group.

For example, storage pools **Silver-10k-External-Pool**, **Gold-NVMe-RAID5-pool**, and **vVols-TI-pool** are added to this resource group, as shown in the following figure.

Sele	ct LDEVs	_							_	_
Sele	ect LDEV(s) from the	e Available LDEV	/s list. Click Add t	to add the LDEV(s), and click	ок.					
A	vailable LDEVs	i						S	elected LDE	/s
*	Filter ON OFF	Select All Pa	iges	Options 🗸 📔 🗧 1	/ 66 🏼 🗲	€		Se	elect All Pages	
	LDEV ID	LDEV Name	Parity Group ID	Pool Name(ID)	Capacity	Ô			LDEV ID	LDEV Name
$\checkmark$	00:00:00	ext-g600-jc	E1-1	Silver-10k-External-Po	2048.00 GB					
$\checkmark$	00:00:01	pool-vol	1-6	Gold-NVMe-RAID5-poo	2969.60 GB					
	00:00:02	JC-HUR-J	-	Gold-NVMe-RAID6-Poo	500.00 GB					
$\checkmark$	00:00:03	pool-vol	2-6	vVols-TI-pool(3)	2969.60 GB					
$\checkmark$	00:00:04	pool-vol	1-6	Gold-NVMe-RAID5-poo	2312.28 GB					
✓	00:00:05	pool-vol	2-6	vVols-TI-pool(3)	2312.28 GB					
	00:00:06		· •		-					
	00:00:07	-	-	2	-	Г				
	00:00:08	-	19 <b>-</b> 0		-					
	00:00:09	VVOL-ALU1	-	-	0.04 GB		Add 🕨			
	00:00:0A	-	9. <b>.</b>		-	L				
	00:00:0B	-	-	22	-					
	00:00:0C	9 <b>-</b> 0		1. A.	· · ·					

You must reserve a range of LDEV IDs for future vVols creation. In the following example, the entire last page of LDEVs are added to this resource group. Each VM takes at least three LDEVs. Add more LDEVs as your vVols environment grows.

1	vailable LDEV	s	_		_	_			S	elected LDEV	s		
\$	Filter ON OFF	Select All Pa	iges	Options 🗸 候	€ 66 / 6	6 → →	Э)		Se	lect All Pages			
/	LDEV ID	LDEV Name	Parity Group ID	Pool Name(ID)	Capacity	Provisio Type	î	•	~	LDEV ID	LDEV Name	Parity Group ID	Pool Na
4	00:FD:EC	-	-	-	-		U,		$\checkmark$	00:00:05	pool-vol	1-3	VVOL-F
∕	00:FD:ED	-	-	-	-				✓	00:00:06	pool-vol	2-3	VVOL-1
4	00:FD:EE	-	-	-	-	-			✓	00:00:07	pool-vol	1-3	VVOL-F
1	00:FD:EF	-	-	-	-	-			✓	00:00:08	pool-vol	2-3	VVOL-T
1	00:FD:F0	-	-	-	-								
1	00:FD:F1	-	-	-	-								
1	00:FD:F2	-	-	-	-	->							
1	00:FD:F3	-	-	-	-								
1	00:FD:F4	-	-	-	-	-	- 1						
1	00:FD:F5	-	-	-	-	-		Add 🕨					
1	00:FD:F6	-	-	-	-	-	-						
1	00:FD:F7	-	-	-	-	-		Remove					
1	00:FD:F8	-	-	-	-	-							
1	00:FD:F9	-	-	-	-	-							
1	00:FD:FA	-	-	-	-	-							
4	00:FD:FB	-	-	-	-								
4	00:FD:FC	-	-	-	-								
4	00:FD:FD	-	-	-	-	-							
4	00:FD:FE	-	-	-	-	-							
1	00:FD:FF	-	-	-	-								
1	00:FE:00	-	-	-	-								
1	00:FE:01	-	-		-	+							
1	00:FE:02		-			-	~						

## Step 3. Create an Administrator User Account for vVols

After the resource group is created, create a dedicated user for vVols operation.

#### 1. Go to Administrator User Group and click Create User.

Hitachi Device Manager	Storage Navigator ports Settings View Tool Help					
Explorer	Administrator User Group					
Storage Systems	<u>User Groups</u> > Administrator User Group					
Analytics	Number of Roles					
Administration	Number of Resource Groups					
🕈 🕅 User Groups	Number of Users					
Administrator User Group	Administrator User Group User Group Type					
🐝 Audit Log Administrator (\	All Resource Groups Assigned					
🍇 Audit Log Administrator (\	Users Roles Resource Groups					
security Administrator (Vi						
🎭 Security Administrator (Vi	Create User Change Password Edit User More Actions					
🔩 Storage Administrator (Vie						
🍇 Storage Administrator (Vid	User Name 1 Account Status					
🔩 Support Personnel Group						
🎭 System User Group	🔲 🧕 admin Enabled					
Manual Resource Groups	🗌 🧕 jchen Enabled					
Cache Partitions	Enabled					

- 2. Create an account named vVols-user.
- Select the **Enable** option to enable the account status.
- Select the local authentication type.
- Enter the password and reconfirm the password.
- 3. Click **Confirm** to create the administrator user account.

Create User		
1.Create User > 2.	Confirm	
Set values for the nev	w user account and click Finish to	o confirm.
User Name:	vVols-user (Max 256 Characters)	
Account Status:	Enable Disable	
Authentication:	Local     External	
	Password:	****
		(6 - 256 Characters)
	Re-enter Password:	*****

**Note** — If multiple VASA Providers are connecting to the storage, create a separate user account or each VASA Provider for tracking purposes. For example, vVols-user2.

## Step 4. Create a Protocol Endpoint and Add it to ESXi Hosts

In VSP storage, a Protocol Endpoint (PE) is called an Administrative Logical Unit (ALU).

1. To create an ALU/PE, go to the **General Task** panel in the left-bottom of the Hitachi Device Manager Storage Navigator screen, and click **Create LDEVs**.

Hitachi Device Manager	Storage Navigator eports Settings View 1	rool Help		
Explorer	VSP5500_NVMe ASE-47.1	12 G10(S/N	1:30595)	
Storage Systems	VSP5500_NVMe ASE-47.112 G10	(S/N:30595)		
* 🗊 VSP5500_NVMe ASE-47.112	Edit Storage System			
🙀 Tasks	Storage System Name		VSP5500 NVMe AS	E-47,112 G10
C Reports	Storage System Type		VSP 5500H	
Components	Serial Number		30595	
・ 💦 Parity Groups	IP Address		172.25.47.112	
🌈 Logical Devices	Contact			
Pools	Location		G10	
Ports/Host Groups/iSC				
Kan External Storage	Allocation Summary			
Replication	Internal/External : Total	[ <b>≠</b> ] 0	pen/Mainframe: T	otal 🚽
	Physical Summary			
		A Alloca	ted	
		Reserved		Used DP Pool
<				Unused DP Pool
	FC			Other
		Available S	Space	Unallocated
			F	Free Space
× >		Physical To	otal	
Analytics	Virtual Summary			
Administration		DP Allocate	ed	
· · ·		DP Unalloc	ated	
General Tasks		Other		
🕅 Create Host Groups		Virtual Tot	aı	
Mt Create iSCSI Targets				Coffinan
Create LDEVs				Sortware

#### 2. Select **ALU** in the **Provisioning Type** field.

- Enter the value 1 in the Number of LDEVs field.
   You only need one ALU per storage system for approximately 16,000 vVols based on current vSphere limits.
- 4. Enter the LDEV name in the LDEV Name Prefix field. For example, VVOL-ALU1.
- 5. Click **Add** to add the ALU to the host group.

Crea	te LDEVs				
1.Cre	ate LDEVs > 2.Confirm	Ú -			
This Click	wizard lets you create and k Finish to confirm the creat	provision LDEVs enter the tion, or click Next if you wa	a information for LDEVs you want to create, ant to add LUN paths for the LDEVs.	, and then click Add. Click	Options to expand the LD
	Provisioning Type:	ALU			Selected LDEVs
	Number of LDEVs:	1 (1-64)			LDEV ID
	LDEV Name:	Prefix VVOL-ALU1	Initial Number	-	
		(Max. 32 characters t or blank)	total including max. 9-digit number,		
	V Options			Add O	

6. Continue to assign the ALU to host groups for ESXi hosts, just like a regular LUN. Ensure the host groups have Host Mode 21 [VMware Extension] with 63 and 114 as the host mode options.

**Note** — The host mode option 54 is optional, as the older VAAI plugin has been removed. Option 54 is no longer required, and is ignored.

reat	te LDEVs >	2.Select LDEVs > 3	.Select Host Groups / iS	CSI Targets > 4	4.View/Change LUN I	Paths > 5.Confi							
elec nd t	ct host groups then click Add.	from the Available Hos Click Next to man the	st Groups list, and then a bost groups or iSCSI I	click Add. If you wa	nt to add iSCSI targe	ets, select iSCSI f	rom S	election Obje	ect, select iSCSI targets	from the Available iS	CSI Targets list		
			- nost groups on locor ,	angets to compound	-								
elec	ction Object:	<ul> <li>Fibre</li> </ul>	iscsi										
ost	Groups:												
A١	vailable Ho	st Groups					S	elected H	ost Groups				
<b>☆</b> F	Filter ON C	OFF Select All Page	Option	s▼ (I€ € 1	/1 ∢→		Se	lect All Pages					
	Port ID	Priority order for provisioning	Host Group 1 🛦 Name	Host Mode	Port ^ Attribute			Port ID	Host Group Name	Host Mode	Port Attribute	Port Security	ł
	CL7-D	7	7D-G00 (00)	00 [Standard]	Bidirectio								
	CL8-A	2	8A-G00 (00)	00 [Standard]	Target								
	CL8-B	4	8B-G00 (00)	00 [Standard]	Target								
	CL8-C	6	8C-G00 (00)	00 [Standard]	Target								
	CL8-D	8	8D-G00 (00)	00 [Standard]	Bidirectio								
	CL2-A	2	ds120-4590-hba	21 [VMware	Target	A CO A							
	CL1-A	1	ds120-4590-hba	21 [VMware	Target								
	CL4-A	2	ds120-4591-hba	21 [VMware	Target	▲ Remove							
	CL3-A	1	ds120-4591-hba	21 [VMware	Target					No Data	Ð		
	CL2-B	4	ds120-4592-hba	21 [VMware	Target								
	CL1-B	3	ds120-4592-hba	21 [VMware	Target								
	CL4-B	4	ds120-4593-hba	21 [VMware	Target								
	CL3-B	3	ds120-4593-hba	21 [VMware	Target								
	<u>CL7-C</u>	5	ucp2k-c4-b3_7C	21 [VMware	Target								
✓	CL8-C	6	ucp2k-c4-b3_8C	21 [VMware	Target								
	<u>CL7-C</u>	5	ucp2k-c4-b4_7C	21 [VMware	Target								
4	<u>CL8-C</u>	6	ucp2k-c4-b4_8C	21 [VMware	Target								
C					>		< 0						1
1	Detail			Sel	lected: 4 of 44			Detail				Selected: 0	

## Part 2. VMware vSphere Administrator – Set up Hitachi Storage Provider for VMware vCenter

## Step 5. Deploy Hitachi Storage (VASA) Provider OVA

Hitachi Storage Provider for VMware vCenter is deployed from an OVF template. You can download the latest OVF file from <u>Downloads Detail - Support | Hitachi Vantara.</u>

This virtual machine is typically deployed into the vSphere management cluster where the vCenter Appliance (VCSA) is deployed. You can also deploy this virtual machine to any vSphere environment as long as it has a network access to the VSP storage. Ensure that the virtual machine is deployed into a High Availability-enabled vSphere Cluster, which is configured by default, to provide the first level of availability. (You can also deploy this virtual machine as a fault tolerant virtual machine to ensure high availability). Hitachi Storage Provider for VMware vCenter is typically deployed into a vCenter Management cluster.

1. Ensure that you have a VMFS or vSAN datastore available to deploy the VASA Provider.

**Note** — You can create VMFS datastores using the Hitachi vCenter Storage Plugin or any other integrations that are available such as, PowerShell cmdlet or vRealize Orchestrator workflow.

vSphere Client	Menu 🗸 🛛 📿 Search in all environments		○ ② ~ Ad	Iministrator@VSPHE
76.46.123 DatacenterB	ID.76.46.39     ACTIONS ~       Summary     Monitor     Configure     Permissions	VMs Datast	ores Networks Updates	
10.76.46.39				
10.76.46.40	Name ↑ ~	Status ~	Type v Datastore Clu	<ul> <li>Capacity</li> </ul>
How Win-Reg-DS	local-c4-b3	🗸 Normal	VMFS 6	231.5 GB
	USP5500-LUN1	✓ Normal	VMFS 6	2 TB



2. Assign an IP address/FQDN to the storage provider VM and complete all other required information.

<ul> <li>1 Select an OVF template</li> <li>2 Select a name and folder</li> </ul>	Customize template Customize the deployment prope	erties of this software solution.				
<ul> <li>Select a compute resource</li> <li>4 Review details</li> <li>5 Select storage</li> <li>6 Select networks</li> <li>7 Customize template</li> <li>8 Ready to complete</li> </ul>	() 4 properties have invalid values					
	✓ Network Configuration	5 settings				
	IP Address	Enter the IP address for Storage Provider				
		10.76.46.168				
	FQDN	Enter the FQDN for Storage Provider. Type "-" if				
		you don't set up the FQDN.				
		hitachi-vasa-b.hvlab.local				
	DNS Server	Enter IP address of your DNS Server				
		10.76.46.10				
	Gateway	Enter IP address of your default Gateway				
		10.76.46.1				
	Netmask	Enter Netmask for this interface				
		255.255.255.0				

**Note** — Generally, the SSO Server domain and the domain you log in to for the vSphere client are the same in the test environment. For example, vsphere.local. However, the template gives you an option to specify different domains.

<ul> <li>1 Select an OVF template</li> <li>2 Select a name and folder</li> </ul>		10.76.46.123
<ul> <li>3 Select a compute resource</li> <li>4 Review details</li> <li>5 Select storage</li> <li>6 Select networks</li> </ul>	HTTPS Port	Enter the HTTPS Port Number for vCenter SSO Server 7444
7 Customize template 8 Ready to complete	Single Sign-On domain name	Enter the Single Sign-On domain name for vCenter SSO Server vsphere.local
	<ul> <li>System Configuration</li> </ul>	3 settings
	Domain Name	Enter your domain ex: co.eng.dev.hitachi.com
	Host Name	Enter host name for this VM hitachi-vasa-b
	NTP	Enter NTP server : recommended for production environments 10.76.46.1

## Step 6. Configure Hitachi Storage Provider for VMware vCenter

1. After the virtual machine is deployed and powered on, open a browser and enter the following URL to access the Hitachi Storage Provider for VMware vCenter web interface

https://VASA-Provider-IPAddress-or-FDQN:50001/

Note — Ensure that you add https at the beginning of the URL, and port 50001 at the end of the URL.

#### 2. Log in with vCenter SSO credentials.



3. Select Manage Storage Systems under Management, and click Add Storage Systems.

Block	Setup				
Hitachi Storage Provide	er for VMware vCenter	- block component	03.6.0.3250 Welco	ome to administrato	@vsphere.local
Management		Manage Storage	Systems		
Manage Storag	e Systems	Physical Sto	orage Virtual Stora	ge	
Manage Storage Capability S	a Containers Schema	Storage Sy Physical Sto	stem:  contain:		GO OFF
Replication	Groups	Storage	Systems Model Typ	e SVP IP Address	Configuration Manage

- 4. Select a Storage System Type and enter the SVP IP address.
- 5. Enter the vVols user name and password that you created earlier.

Add Storage System		
Storage System Type :	VSP G2000/5100/5500/5100F •	
SVP IP address :		
User ID :	vVols-user	
Password :	••••••	
		OK Cancel

Click **Reload** to update the progress until the storage system is added successfully.
 You can add multiple storage systems into the same VASA Provider.

Block Setup	10.76.46.168:50001 says [IB303021]	
Hitachi Storage Provider for VMware vCenter - block component 03.6.	Some or all of the processing is complete. Check the list of storage systems.	Help About Logout
Management Manage Storage Syste	ОК	
Manage Storage Systems Manage Storage Containers		Reload
Capability Schema Physical Storage S	is V ON OFF	30 V H 4 page [ 1 / ] GO H
Change Credentials Storage System	IS Model Type SVP IP Address Configuration Manager REST API Se Add Storage Systems Refresh Storage	erver IP Address Serial Number Microcode Status Last Update E System (Edit Storage Systems) Remove Storage Systems)
ReplicationConnectionSetting		

7. Create a storage container.

There is a one-to-one relationship between a vVol storage container and a storage resource group.

8. Select Manage Storage Containers under Management, and click Create Storage Container.

Management	Manage	Storage C	Containers							
Manage Storage Systems	Na	me	▼ is	•	ON	F	30	▼ K	• page [	1 / 1 ] GO
Manage Storage Containers	Stor	age Conta	Description	Storage System	Capacity	Logical	Capacity	Snapsho	t Capacity	Resource Group
Capability Schema					Total Free	Total	Free	Total	Free	
Update Software							Create S	Storage Con	tainer Edit	Storage Container

- Provide a name for this storage container.
- Select a storage system.
- Select a resource group. The available storage pool is listed in the **Capability Profiles** table.
- Select an undefined pool and click **Define Profile**.

Stept Specily mormation	about the storage contain	ner and resour	irce group.					
Name :	vsp5500-CS							
Description :	input storage containe	er description.	J.					
Storage System :	RAID900_30595	T						
Resource Group :	vVols-RG	•						
Step2         (Optional) Specify           Port for Dummy Host Group         Step3         Specify a capability           Capacity(Free/Total) :	a port for the dummy host : Select Port • profile for the DP pool that	group creatio at exists in the OMB /	on. The port selection is e storage container. 0MB	required for VVol ı	eplication.			
Step2       (Optional) Specify         Port for Dummy Host Group         Step3       Specify a capabilit         Capacity(Free/Total) :         Logical Capacity(Free/Total)         Snapshot Capacity(Free/Total)         Capability Profiles	a port for the dummy host : Select Port • profile for the DP pool that : al) : 5.1	group creatio at exists in the OMB / OMB / 5TB / {	on. The port selection is e storage container. OMB 0MB 5.15TB	s required for VVol ı	eplication.			
Step2 (Optional) Specify Port for Dummy Host Group Step3 Specify a capabilit Capacity(Free/Total) : Logical Capacity(Free/Total) Snapshot Capacity(Free/Total) Capability Profiles Name	a port for the dummy host : Select Port • profile for the DP pool that : () al) : 5.1 Description	group creatio at exists in the OMB / OMB / 5TB / { Pool	on. The port selection is e storage container. 0MB 0MB 5.15TB Pool Name	Pool Type	eplication.	acity	Logical	Capacity
Step2 (Optional) Specify Port for Dummy Host Group Step3 Specify a capabilit Capacity(Free/Total) : Logical Capacity(Free/Total) Snapshot Capacity(Free/Total) Capability Profiles Name	a port for the dummy host : Select Port profile for the DP pool that : (1) al) : 5.1 Description	group creatio at exists in the OMB / OMB / STB / Pool DP 2	on. The port selection is e storage container. 0MB 0MB 5.15TB Pool Name Gold-NVMe-RAID5-	Pool Type Pool HDP	Car Total 5.15TB	acity Free 5.15TB	Logical Total ∞	Capacit; Free

The system needs a profile for each pool. You can provide temporary values and complete the profile at a later point in time.

The following example shows an initial profile used to create a storage container. You can complete the storage profile for production use cases after testing the VM deployment.

Name : Tier 1 Profile			
Description : input profile description.			
Managed Capabilities User Defined			
Performance IOPS - class		ier1_IOPS 🔹	
Performance Latency - class		Select the performance latency variability * 👂	
Availability - class		Select an availability * 🦻	
Cost - class			
Recovery by Virtual Infrastructure Integrator.			
Snapshot Backup Importance - Class	Select a bac	up policy T မြ	
Auto-generated Capabilities			
✓ Drive Type/Drive Speed	SSD 💬	Deduplication	
Pool Type	HDP 🗩	Compression	
RAID Level	RAID5(3D+1P) (Comparison of the second secon		
C Encryption	No 💬		
Spanshot	Yes 🗩		

## Step 7. Register Hitachi Storage Provider for VMware vCenter

- 1. Log in to the vSphere Client and select vCenter.
- 2. Under the Configuration tab, click **Storage Providers**, and then click **Add**.

vm vSphere Client	Menu 🗸 🛛 🔍 Search in all	l environments		C	75
<ul> <li>Io.76.46.123</li> <li>DatacenterB</li> <li>ClusterB</li> <li>10.76.46.39</li> <li>10.76.46.40</li> <li>HitachiStorageProv</li> <li>Win-Reg-DS</li> </ul>	<ul> <li>IO.76.46.123</li> <li>Sum Mo Confi</li> <li>Settings</li> <li>General</li> <li>Licensing</li> <li>Message of the Day</li> <li>Advanced Settings</li> <li>Authentication Proxy</li> <li>vCenter HA</li> <li>More</li> </ul>	ACTIONS ~ Permis Datace Host + Add Synchronize Storage I Storage Provider/Storage Sys ¥ I IOFILTER Provider 10.76.46.39 5e31e3c3-fea3-7484-dd53 IOFILTER Provider 10.76.46.40 5e32059e-20d4-f742-33aa VMware vSAN	ts & C N Providers   Status ¥ Online Online	V Data Rescan Activ Y  Active  Active	€S × F Pric  1  1
	Alarm Definitions Scheduled Tasks Key Management Serv Storage Providers	VMware vSAN	Online		

- 3. Provide the following information:
- In the URL field, enter https://VASA-Provider-IP-or-FQDN:50001/version.xml
   For example, https://vphost.xyz.com:50001/version.xml or https://10.76.46.120:50001/version.xml
- In the User name field, enter the vCenter user name in the format shown in the following figure.
- In the Password field, enter the vCenter password.

## New Storage Provider 10.76.46.122

Name	Hitachi VASA
URL	https://hitachi-vasa-b.hvlab.local:50001/versior
User name	vsphere.local\administrator
Password	
Use storage provider certificate	
Certificate location	BROWSE
	CANCEL

Х

The following message might appear. Ignore this message and proceed.



The Hitachi VASA provider appears with an Online status.

vm vSphere Client	Menu 🗸 🛛 🔍 Search in a	ll environments		C	2 0
	₽ 10.76.46.123	ACTIONS ~	10-00-00		
10.76.46.123	Sum Mo Confi	Permis Datace	Hosts & C	V Data	is Netw
✓ In DatacenterB✓ In ClusterB	✓ Settings	🕂 Add 🛛 🔯 Synchroni:	ze Storage Providers	Rescan	X Remove
10.76.46.39	General Licensing Message of the Day Advanced Settings Authentication Proxy vCenter HA More Alarm Definitions Scheduled Tasks	Storage Provider/Storag	e Sys 🔻 Status 🔻	Activ 🔻	Priority
		▲ IOFILTER Provider 10.	76.46.40 Online		
B Win-Reg-DS		5e32059e-20d4-f7	42-33aa	Active	1
		⊿ Hitachi VASA	Online		
		VSP 5500H_30595	5 (1/1 onl	Active	0
		VMware vSAN	Online		
			2		
		General Supported	Vendor IDs Certi	ficate Info	
	Storage Providers				
	▼ vSAN Update Internet Connectivity	Provider name Provider status Active/standby status Activation URL Provider version VASA API version Default namespace Provider ID	Hitachi VASA Online 	0001/version. 5-9d86-7a7b9	xml 1d494923
		Supported profiles	Storage Profile Based	I Managemen	t

Use a certificate from a local certificate authority (CA) if one is used in your production environment. For a test environment, you can skip the following and use the default self-signed certificate.

If the Hitachi VASA Provider certificate needs to be signed by a local certificate authority (CA), then follow this procedure:

Assuming the FQDN of Hitachi VASA Provider is vasaprod.xyz.org, run the following from VASA Provider

- Create a new keystore "keytool -genkey -alias vasaproviderservercertificate -keyalg RSA -keysize 2048 -keystore keystore.jks.SAN".
- Generate certificate signing request (CSR) note the addition of the subject alternate name (SAN) option, which is required by VMware - "keytool -certreq -alias vasaproviderservercertificate -file csrSAN.txt keystore keystore.jks.SAN -ext SAN=dns:vasaprod.xyz.org".
  - SAN is the FQDN of the Storage Provider VM.
- Use this CSR to request a certificate from local CA. Download the certificate from the CA to the VASA Provider (.p7b or similar certificate that CA generated)
- Import the certificate to the keystore "keytool -import -alias vasaproviderservercertificate -file vasaprod-SAN.p7b -keystore keystore.jks.SAN"
- The keystore file keystore.jks.SAN is now copied to keystore.jks. Ensure that the owner of the keystore.jks file is either vptomcat or root.
- Reboot the VASA provider VM. The certificate with SAN is now being used by the Hitachi Storage Provider for VMware vCenter, and you can register it to the vCenter.

**TIP:** If you want to register the same Hitachi VASA provider to multiple vCenters, for example, a VMware Cloud Foundation (VCF) deployment, then ensure that the setting multipleVcSupport is set to true in the VasaProvider.properties config file. This is now default setting in releases greater than 3.5.9. This file is located in the / usr/local/hitachivp-b/tomcat/webapps/VasaProvider/META-INF/ directory.

If the multipleVcSupport setting is not set prior to 3.5.9, then set it and run the createCertifications.sh script, which is located in the /usr/local/hitachivp-b/ directory. This script updates the registry and restarts the VASA Provider (VP). Other vCenters can now register to this VP.

## Step 8. Verify that the PE is Available and Visible

Verify that the protocol endpoint (PE) is visible in vSphere ESXi hosts either in the vCenter UI or from the esxcli command. This is the (ALU/PE) that the storage administrator presented to vSphere Cluster/ESXi hosts in "Step 4. Create a Protocol Endpoint and Add it to ESXi Hosts" on page 11.

Note: There are instances where the PE is not visible in the vCenter UI but the esscli storage core device list command does indeed return VVOL=PE is TRUE. In this case, you can proceed to Step 9 (vVols datastore creation) which incidentally will also make the PE visible in vCenter UI.

- 1. Log in to the vSphere Client, select Hosts and Clusters, and then select an ESXi host.
- 2. Select Protocol Endpoints on the Configure tab.

You will notice the protocol endpoint with the Operational state Accessible.



Optionally, on ESXi hosts, you can view the protocol endpoints (PEs) by running the following command from the esxcli command line.

esxcli storage core device list -p

This will display the devices that are recognized as PEs. Note the Is VVOL PE=True value.



The esxcli storage vvol protocolendpoint list command can show the PEs as well. However, there have been instances where creating the vVols datastore [step 9] has to be performed in order for vCenter UI to show the PE as visible.

#### For example:

# esxcli storage vvol protocolendpoint list



**Note** — If the protocol endpoint is not visible after running the protocolendpoint list command or is not visible in the vCenter UI under the Hosts/ConfigureProtocol Endpoints window, then you must perform a storage refresh in the Hitachi VASA Web user interface. This occurs if VASA is deployed first and then PEs are added. Perform a refresh of the storage system that is presenting the PE, which ensures that VASA PE information is current. Retry the protocolendpoint list command or view the protocol endpoint in the vCenter. If PE the is still not showing as visible but the esxcli storage core device list command shows "VVOL PE=True: value, move to Step 9 to create a vVols datastore. If vVols datastore creation fails, verify network connectivity to VASA port 50001 from vCenter and ESXi using a command such as ncat.

For example:

nc -zv VASA-FQDN 50001

Hitachi Storage Provider for VMware vCente	er - block component 03	6.0.3251 Welcome to administrate	or@vsphere.lo	cal			
1110000000							
Management	Manage Storage Syst	tems					
	Physical Storage V	irtual Storage					
Manage Storage Systems	i nyolour etoruge	intual etorago					
Manage Storage Containers							
	Storage System: ~	contains V	GO OFF			30 🗸 🔢	• p
Capability Schema	Disusional Stamone St						
Replication Groups	Physical Storage S	stems					Original Marine
		Storage Systems	Model lype	SVP IP Address	Configuration Manager RESTAPTS	erver IP Address	Serial Nur
	R900_NVMe AS	E-47.112 G10 🔞 Pool's 📫 LDEV's	VSP 5500H	172.25.47.112	-		30595
					Add Storage Sustame	Defreeh Sterage	Sustama
Maintenance					Add Storage Systems	Refresh Storage	Systems

## Step 9. Create a vVols Datastore

- 1. 1. Right-click **Cluster**, select Storage, and then select Rescan Storage.
- 2. 2. Click New Datastore after the rescan is complete.



3. In the New Datastore window, select **VVol** and then click **Next**.

New Datastore	
1 Type 2 Name and container sele	Type Specify datastore type.
3 Select hosts accessibility 4 Ready to complete	<ul> <li>VMFS Create a VMFS datastore on a disk/LUN.</li> <li>NFS Create an NFS datastore on an NFS share over the network.</li> </ul>
	<ul> <li>VVol Create a Virtual Volumes datastore on a storage container connected to a storage provider.</li> </ul>

You should see the storage container that was previously created by Hitachi Storage Provider for VMware vCenter.

- 4. Select the storage container and provide a name.
- 5. Continue the process to complete the VVol Datastore creation.

#### New Datastore





If there are any issues at this stage, you can run the following commands to list ESXi status.

```
[root@DC1-Node4:~] esxcli storage wol protocolendpoint list
naa.60060E8140A3D140A3D1000000000001
   Host Id: naa.60060e8012a3d1005040a3d100000001
   Array Id: Hitachi: USPG400G600 441937
   Type: SCSI
   Accessible: true
   Configured: true
   Lun Id: naa.60060e8012a3d1005040a3d100000001
   Remote Host:
   Remote Share:
   NFS4× Transport IPs:
   Server Scope:
   Server Major:
   Auth:
   User:
   Storage Containers: ad635618-ca2c-4600-ba12-464524e4d2b4
[root@DC1-Node4:~] esxcli storage vvol storagecontainer list
DC1 G600 vVo101
   StorageContainer Name: DC1_G600_Wol01
  UUID: vvol:ad635618ca2c4600-ba12464524e4d2b4
   Array: Hitachi: USPG400G600 441937
   Size(MB): 31739610
   Free(MB): 14791434
   Accessible: true
   Default Policy:
[root@DC1-Node4:~] esxcli storage vvol vasaprovider list
Hitachi-0356
   VP Name: Hitachi-0356
   URL: https://dc1vasa0350.ucp.local:50001/version.xml
   Status: online
   Arrays:
         Array Id: Hitachi:USPG400G600_441937
         Is Active: true
         Priority: 0
[root@DC1-Node4:~]
```

If the new VVol Datastore is created successfully in one ESXi host, but the PE or VVol Datastore is not showing up in other hosts, you will need to manually mount it to all other hosts in the cluster. Make sure that ALU/PE devices are listed in the **Storage Devices** as shown.

10.76.34.167	: ACTIO	NS								
Summary Monitor	Configure	e P	ermissions VMs Da	atastores I	Networks U	pdates				
Storage	~ ^	Sto	rage Devices							
Storage Adapters	-	REF	RESH ATTACH DETACH	RENAME	TURN ON LED	TURN OFF LED				
Host Cache Configuration	on		Name T	LUN T	Туре т	Capacity <b>T</b>	Datastore <b>Y</b>	Operational State <b>T</b>	Hardware Acceleration <b>T</b>	Drive Type
Protocol Endpoints I/O Filters			isk (naa.60060e80233a b50050703ab5000000 3f)		urun	0.00 10	B 01000 001	muuneu	σαρροττο	
Networking Virtual switches VMkernel adapters	~		HITACHI Fibre Channel D isk (naa.60060e80233a b50050703ab5000000 56)	1	disk	2.00 TB	HAL-Datast ore	Attached	Supported	HDD
Physical adapters RDMA adapters			HITACHI Fibre Channel D isk (naa.60060e80233a b50050703ab5000000 35)	2	disk	46.88 MB	Not Consumed	Attached	Supported	PE
TCP/IP configuration Virtual Machines	~		Local HPE RAID Ctlr (t1 0.D4963627F63686075 F0794048644E345)	1	array control ler		Not Consumed	Attached	Not supported	HDD

- 1. Go to the newly created VVol Datastore and click ACTIONS
- 2. Click Mount Datastore to Additional Hosts and continue to add other hosts in the cluster.

⊟ HAL-vVol-Datastore	ACTIONS
Summary Monitor Configure	Actions - HAL-vVol-Datastore
Quick Filter     Enter value       Image: Image of the second seco	C Browse Files 避 Register VM
Image:	C Refresh Capacity Information Move To Rename
	Mount Datastore to Additional Hosts

## Step 10. Create a Test VM to Verify vVol Operation

After the vVols datastore is created, create a test virtual machine (VM) for initial validation.

A quick way to verify the vVol operation is to clone a VM from VMFS datastore to a vVols datastore.

1. Right click on an existing VM, select Clone and then select Clone to Virtual Machine.

#### 2. In the Select Storage section, select VVol No Requirements Policy

A vVol datastore should appear at top of the list as compatible storage.

#### 3. Select the vVol datastore and select clone.

	00	inguie per disk	
Tr	nin Provision	~	
	VVol No Requir	ements Policy	~
Capacity	Provisioned	Free	
2.58 TB	160.96 GB	2.52 TB	
	Capacity 2 58 TB	Thin Provision VVol No Requir Capacity Provisioned 2.58 TB 160.96 GB	Thin Provision     V       VVol No Requirements Policy       Capacity     Provisioned       Free       2.58 TB     160.96 GB       2.58 TB

4. Power on the test VM that you just cloned, and ensure that it powers on successfully.

This confirms that you have successfully deployed a basic vVols environment.

5. Take a snapshot of your configured Hitachi VASA Provider. If you want to reset the configuration after some basic tests, you can use this snapshot to revert.



## Step 11. Examples of Advanced Storage Capabilities and Storage Policy Based Management

When the vVol environment is operational, the following advanced capabilities are available:

- Stage 1: In the Hitachi Storage Provider, apply storage capabilities on one or more pools that make up the storage container.
- Stage 2: In the vSphere client, set up VM storage policies that specifies a combination of these capabilities.

The following figure shows an example of how vVols Storage container and Storage Policy-Based Management (SPBM) policies can be configured with the Hitachi Implementation. There are more advanced configurations possible for production use cases. This example shows that the virtual machines (VMs) with a certain policy applied will land in a certain area of a storage container that matches that capability. vSphere administrators need not pick a datastore with a specific capability. The storage container, vVol datastore supports all capabilities.

In the following example, the virtualization capabilities of the VSP Storage use external pool resources from other VSPs or third party arrays.

- Two Gold NVMe Dynamic Provisioning (DP) pools were created in VSP 5500. One of the pools has encryption capabilities.
- Silver SAS 10k DP pool was created in VSP 5500 from external volumes from virtualized VSP or third party arrays.
- VASA Provider advertises the following to vSphere SPBM:
  - Gold Resources with Tier-1 performance capability with choice of encryption (Yes/No).
  - Silver Resources with Tier-2 performance capability.

Use the vSphere SPBM to enable vSphere administrators and VM owners the ability to choose Tier 1 Gold, Tier 1 Gold with Encryption, or Tier 2 Silver policies for VM and container services.



Stage 1 is to enable additional capabilities on the storage pools that are configured as part of the storage container.

- 1. On Hitachi Storage Provider for VMware vCenter, go to Manage Storage Containers.
- 2. Select a storage container and click Edit Storage Container.
- 3. Select a pool in Capability Profiles and click Define Profile.

The system automatically detects certain capabilities, (for example encryption, and allows other managed capabilities to be assigned various values based on the pool or system configuration.

In the following examples, the encryption is set to yes for the Gold-NVMe-vsp5500-CP pool and the encryption is set to no for the Gold-NVMe-vsp5500-Enc-CP pool. vSphere administrators now have a choice for encryption capability when building their VM policy. A storage administrator can provide other capabilities such as latency, IOPS, availability, and cost metrics.

Name : G	old-NVMe-vsp5500-CF	)					
Description : in	put profile description.						
Managed Capa	abilities User Define	d					
<ul> <li>Performan</li> <li>Performan</li> </ul>	ce IOPS - class		Tier1_IOI	PS tencv	<b>v</b> 9	<b>T</b> @	
Availability	- class		Select an	availability 🔻 🖻			
Cost - class	6		10		^ - @		
Recovery by	Virtual Infrastructure In napshot Backup Impor	tegrator. tance - Class	Select a ba	ickup policy 🔻 🗩			
Auto-generate	ed Capabilities						
Drive Type	/Drive Speed	- 💬		Deduplica	ation		
Pool Type		HDP 🗩		Compres	sion		
RAID Leve	el	RAID5(3D+	1P) 🥯				
Encryption	1	No 💬					
-		A DESCRIPTION OF A DESC					

As shown in the following figure, Tier 1\_IOPS and Tier 1\_Latency are set for the capability profile for both the Gold pools. However, they have different encryption policies.

age Container		
ne Capability Profile		<u> </u>
Specify the name and pr	ovide a description of the cap	pability profile, and then select the capabilities to be registered .
Name : Gold-NVM	e-vsp5500-Enc-CP	
Description : input profile	e description.	
Managed Capabilities	User Defined	
Performance IOPS -	- class	Tier1_IOPS ▼ 👳
Performance Latence	:y - class	Tier1_Latency ▼ □
Availability - class		Select an availability *
Cost - class		10
Recovery by Virtual In	frastructure Integrator.	
Snapshot I	Backup Importance - Class	Select a backup policy *
Auto-generated Capabi	lities	
Drive Type/Drive Sp	eed - 💬	Deduplication
Pool Type	HDP 💬	Compression
RAID Level	RAID5(3D-	D+1P) 의
Encryption	Yes 💬	
Snapshot	Yes 💬	
		OK Cancel
	specify the name and profile         Name :       Gold-NVM         Description :       input profile         Managed Capabilities <ul> <li>Performance IOPS -</li> <li>Performance Latence</li> <li>Availability - class</li> <li>Cost - class</li> </ul> Recovery by Virtual In <ul> <li>Snapshot f</li> <li>Drive Type/Drive Sp</li> <li>Pool Type</li> <li>RAID Level</li> <li>Encryption</li> <li>Snapshot</li> </ul>	Intercentation         Intercentatin         Interce

4. Create another capability profile for Silver-SAS-10k-External-pool with Tier 2 performance settings.

ne Capabilit	y Profile		chility working and they append the comphilities to be registered.
specity the fi	ame and provide a desc	inpuon or the capa	ability prome, and then select the capabilities to be registered .
Name :	Silver-external-volumes		
Description :	input profile description.		
Managed Ca	apabilities User Define	ed	
Perform	ance IOPS - class		Tier2 IOPS
Perform	ance Latency - class		Tier2_Latency
🗆 Availabi	lity - class		Select an availability 🔨 🛩
Cost - cl	ass		10
Recovery	by Virtual Infrastructure In	ntegrator	
	Snapshot Backup Impo	tance - Class	Select a backup policy * 🖻
-Auto-gener	ated Capabilities		
	ype/Drive Speed	External 💬	Deduplication
Drive T			
Pool Ty	pe	HDP 🗩	Compression
Pool Ty	pe evel	HDP 💬 - 💬	Compression
Prive Tree     Pool Ty     RAID L     Encrypt	pe evel ion	HDP	Compression

- 5. Configure the VM storage policies that are chosen during VM creation.
- 6. Log in to the vSphere Client.
- 7. On the home page, select VM Storage Policies under Policies and Profiles.

#### 8. Click Create VM Storage Policy.

vm vSphere Client	Menu 🗸 🔍 Search in all environments
Policies and Profiles	VM Storage Policies
📑 VM Storage Policies	🚰 Create VM Storage Policy
🕞 Host Profiles	Name
	Host-local PMem Default Storage Policy
	K VM Encryption Policy
	VSAN Default Storage Policy
	VVol No Requirements Policy

9. Create two Gold Policies. Specify encryption for one policy.

#### 10. For each policy, provide a name and click **Next**.

Create VM Storage Policy	Name and descr	iption
1 Name and description	vCenter Server:	<b>10</b> 76 46 122 ×
2 Policy structure	Name:	Tier 1 IOPS (Gold) with Encryption
3 com.hitachi.storageprovider.vvol r	Description:	Storage Encryption (data at rest) with
4 Storage compatibility		Tier 1 performance
5 Review and finish		ĥ

#### 11. On Datastore specific rule, select Enable rule for "com.hitachi.storageprovider.vvol" storage and click Next.

Create VM Storage Policy	Policy structure	$\times$
1 Name and description	Host based services	
2 Policy structure	Create rules for data services provided by hosts. Available data services could include encryption, I/O control, caching, etc.	
3 com.hitachi.storageprovider.vvol r	Host based services will be applied in addition to any datastore specific rules.	
4 Storage compatibility		
5 Review and finish	Datastore specific rules Create rules for a specific storage type to configure data services provided by the datastores. The rules will be applied when VMs are placed on the specific storage type.  Enable rules for "vSAN" storage  Enable rules for "com.hitachi.storageprovider.vvol" storage  Enable tag based placement rules	
	CANCEL BACK NEXT	

12. Select rule placement capabilities.

In the following example, IOPS – Class and Latency – Class with **Tier 1** values are added for the Gold policy and the encryption is set to yes. Therefore, the policy is named Tier 1 IOPS (Gold) with Encryption. The other gold policy does not need to specify the encryption.

Create VM Storage Policy	com.hitachi.storageprovic	der.vvol rules	×
1 Name and description	Placement Replication Tags		
2 Policy structure	Performance IOPS – Class (j)	V Tier1_IOPS	REMOVE
3 com.hitachi.storageprovider.vvol r		Tier3_IOPS	
4 Storage compatibility			
5 Review and finish	Performance Latency – Class 🕦	Tier2_Latency Tier2_Latency Tier3_Latency	REMOVE
	Encryption (j)	Yes	REMOVE
	ADD RULE Y	No Yes	

The compatible vVol Datastore shows up in the list.

#### 13. Click Next and continue to complete the Create VM Storage Policy wizard.

Create VM Storage Policy	Storage compatibility >
1 Name and description 2 Policy structure	Compatible storage 5.15 TB (5.15 TB free)
3 com.hitachi.storageprovider.vvol r	Name y Datacenter y Type y Free Space y Capacity y Warnings y
4 Storage compatibility	VVOL-DS-vsp5500 DatacenterB VVol 5.15 TB 5.15 TB
5 Review and finish	
	CANCEL BACK NEXT

#### 14. Repeat these steps to create the second gold policy without **Encryption** being specified as a capability.

Create VM Storage Policy	Name and desc	ription
1 Name and description	vCenter Server:	<b>10</b> 76 46 122 ×
2 Policy structure	Name:	Tier 1 IOPS (Gold)
3 Storage compatibility	Description:	Tier 1 performance
4 Review and finish		

#### 15. Repeat these steps to create a third VM storage policy: Tier 2 IOPS (Silver) with Tier 2 performance capabilities.



## Step 12. Deploy VMs with VMware SPBM and View vVols

1. Click Create New VM to create a new virtual machine (VM) or right-click on an existing VM and click **Clone to Virtual Machine** to clone an existing virtual machine.



#### vm-on-vmfs-ds1 - Clone Existing Virtual Machine

3 Select storage			20002		81013		
4 Select clone options			Co	nfigure per disk	0		
5 Ready to complete	Select virtual disk format:		Thin Provision	<u> </u>			
	VM Storage Policy:		Tier 1 IOPS (Gold) with Encryptio				
	Name	Capacity	Provisioned	Free			
	<ul> <li>Storage Compatibility: Com</li> </ul>	patible					
	VVols-vsp5500-DS	7.15 TB	13.17 GB	7.14 TB			
	<ul> <li>Storage Compatibility: Incor</li> </ul>	<ul> <li>Storage Compatibility: Incompatible</li> </ul>					
	local-c4-b4	232.5 GB	5.02 GB	227.48 GB			

2. On the **Select storage** page, select the **VM Storage Policy: Tier 1 IOPS with or without Encryption.** 

For this example, a policy with Encryption is selected. The vVol datastore is shown as compatible.

- 3. Click Next.
- 4. Repeat the clone VM steps (step numbers to be specified) to create a second vVol VM with VM Storage Policy: Tier 2 IOPS (Silver).

A second VM with Silver policy is added.



- 5. After all the vVol VMs are created, verify the vVols in the Hitachi Storage Provider web interface.
- 6. Select Manage Storage Container under Management.
- 7. Select the storage container, and then select the VVols tab.

Management	vsp5500-CS												
Storage Container													
Manage Storage Systems	Name	e vs	sp5500-CS	Desc	cription	1				Stor	rage Syster	n	RAID900_30595
Manage Storage Containers		Total 7.	15TB			Total	00					Total	-
	Capacity	Free 7.	14TB	Logical Ca	apacity	Free	00		1	Snapsho	ot Capacity	Free	10.86TB
Capability Schema		Used 13	3.17GB			Used	96.14GB					Used	-
Replication Groups	Resource	Group v\	/ols-RG	TI	Pools		TI 3			Dumm	ny Host Gro	oup	-
Maintenance	VM Nam	ie i	contains VICES	G	O OFF		3	0 •	H I	page [	1/1]	GO	Filterd: 6 / All:6
General Settings	VIVI	Name	VMFSFIle		VVOI I	ype	volume	Label	Capacity	Pool	Binding A	LUS	VIM Policy Name
Download Logs	vm-on-vv	ols-Gold1	vm-on-vvols-Gold1		Config		00:FE:02		4.00GB	UP 2	00:00:06		ier 1 IOPS(Gold) Encryption
Bomiloud Edgo	vm-on-vv	/ols-Gold1 vm-on-vvols-Gold1-3bea3cb		3cbd.vswp	Swap		00:FE:00		4.00GB	DP 2	00:00:06	[	Default Profile for Swap VVol
Update Certificate	vm-on-vv	ols-Gold1	vm-on-vvols-Gold1.vmdk	6	Data		00:FE:03		40.00GB	DP 2	00:00:09	Т	ier 1 IOPS(Gold) Encryption
Change Credentials	vm-on-vv	ols-Silver	vm-on-vvols-Silver1		Config		00:FE:01		4.00GB	DP 1	00:00:09	Т	ier 2 IOPS (Silver)
	vm-on-vv	ols-Silver	1 vm-on-vvols-Silver1-3bea	a3cbc.vswp	Swap		00:FE:05		4.00GB	DP 2	00:00:09	[	Default Profile for Swap VVol
Restart Service	vm-on-vv	ols-Silver	1 vm-on-vvols-Silver1.vmd	k	Data		00:FE:04		40.00GB	DP 1	00:00:06	Т	ier 2 IOPS (Silver)
Troubloshooting Guido													

This lists the vVols created and their associated mapping to storage objects and policies. Storage administrators with an assigned read-only vCenter credentials can view this information. They can also access this information from tools such as, the Storage Navigator.

Hitachi Device Manager st	orage Navigator	4-17-12-20			
File Actions Reports	s Settings View	Tool Help			
Explorer	Silver-10k-Externa	l-Pool(1)			
Storage Systems	R900 NVMe ASE-47.112	G10(S/N:30595	) > <u>Pools</u> > Silv	er-10k-External-Poo	l(1)
* 🇊 R900_NVMe ASE-47.112 G10(S/N:3 館 Tasks	Pool Volumes V	rtual Volume	es TI Root	/olumes	
🛍 Reports	Create LDEVs Ad	d LUN Paths	Expand V-VOLs	More Actions	-
Components	Filter ON OFF	Select All Pa	ages Column Set	tings	_
Marity Groups				Emulation	Capacity
Cogical Devices	LDEV ID	LDEV Name	Status	Туре	Total
Cols	00:FE:00		Normal	OPEN-V CVS	4.00 GB
Gold-NVMe-RAID6-Pool(0)	00:FE:01		Normal 🥥	OPEN-V CVS	40.00 GB
Silver-10k-External-Pool(1)					
() vVols-TI-pool(3)					

You can view VMFS volumes and storage pools within the Hitachi VASA Provider web interface.

1. **Select Manage Storage Systems** under Management, and click **LDEVs** to view the VMFS volumes and storage pools.

Management	Manage Storage Systems			
Manage Storage Systems	Physical Storage Virtual Storage			
Manage Storage Containers				
Capability Schema	Storage System: V contain: V GO OFF			
Poplication Groups	Physical Storage Systems	a <b>na</b> mangan sa sa sa		
Replication Groups	Storage Systems	Model Type	SVP IP Address	
	USP5500-47.110Vsce G10	VSP 5500H	172.25.47.110	-
Maintenance				

Datastores and their mapping to storage objects are listed.

Management	Mana	ige Volum	nes - VSP5500-47.110	-Vsce G10			
Manage Storage Systems Manage Storage Containers Capability Schema Replication Groups	Da Sele	tastore Na ect Volume fine Profile	me ▼ contains ▼ and click Define Profile.		GO	OFF	
Maintenance	Colur Volu	mn Settings Ime's Volume	Datastore Name ▲	Profile Status	Pool	Resource Group	
Constal Sattings		<u>00:01:0C</u>	R900-24ssd-0	Disable	DP 0	meta_resource	ł
General Settings		00:01:0D	R900-24ssd-1	Disable	DP 0	meta_resource	ł
Download Logs		00:01:0E	R900-24ssd-2	Disable	DP 0	meta_resource	ł
Update Certificate		00:01:0F	R900-24ssd-3	Disable	DP 0	meta_resource	ł
Change Credentials		00:01:10	R900-24ssd-4	Disable	DP 0	meta_resource	ł
Restart Service		00:01:11	R900-24ssd-5	Disable	DP 0	meta_resource	ł
Troubleshooting Guide		00:01:12	R900-24ssd-6	Disable	DP 0	meta_resource	ł
Lindate Software		00:01:13	VSP5500-Gold-NVMe-1	Disable	DP 0	meta_resource	ł

## Conclusion

For additional information, consult the Hitachi VASA provider deployment guide and release notes, available <u>here</u>. This location also includes the OVA/OVF files for download.



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