QSAN Official Document

Proxmox Setup Guide

Application Note

May 2024

ANNOUNCEMENT

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PREFACE

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- Via Telephone: +886-2-77206355
- (Service hours: 09:30 - 18:00, Monday - Friday, UTC+8)
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- (Service hours: 09:30 - 02:00, Monday - Friday, UTC+8, Summer time: 09:30 - 01:00)
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Information, Tip, and Caution

This document uses the following symbols to draw attention to important safety and operational information.

INFORMATION

INFORMATION provides useful knowledge, definition, or terminology for reference.

TIP

TIP provides helpful suggestions for performing tasks more effectively.

CAUTION

CAUTION indicates that failure to take a specified action could result in damage to the system.

1. PROXMOX INTRODUCTION

1.1. What is Proxmox

Proxmox VE (Virtual Environment) is a complete, open-source server management platform for enterprise virtualization. It tightly integrates the KVM (Kernel-based Virtual Machine) hypervisor and LXC (Linux Containers), software-defined storage and networking functionality, on a single platform. With the integrated web-based user interface you can manage VMs (Virtual Machines) and containers, high availability for clusters, or the integrated disaster recovery tools with ease.

Proxmox fits the SMB (Small and Medium-sized Business) the best, which requires the IT infrastructure for virtualization solutions that have been dedicated. Also, its intuitive GUI (Graphical User Interface) gives the way for the centralized management of VMs, how the network is set, and how high the features are available. Proxmox allows SMBs to design the tool according to its open-source nature and what fits them while avoiding vendor lock-in.

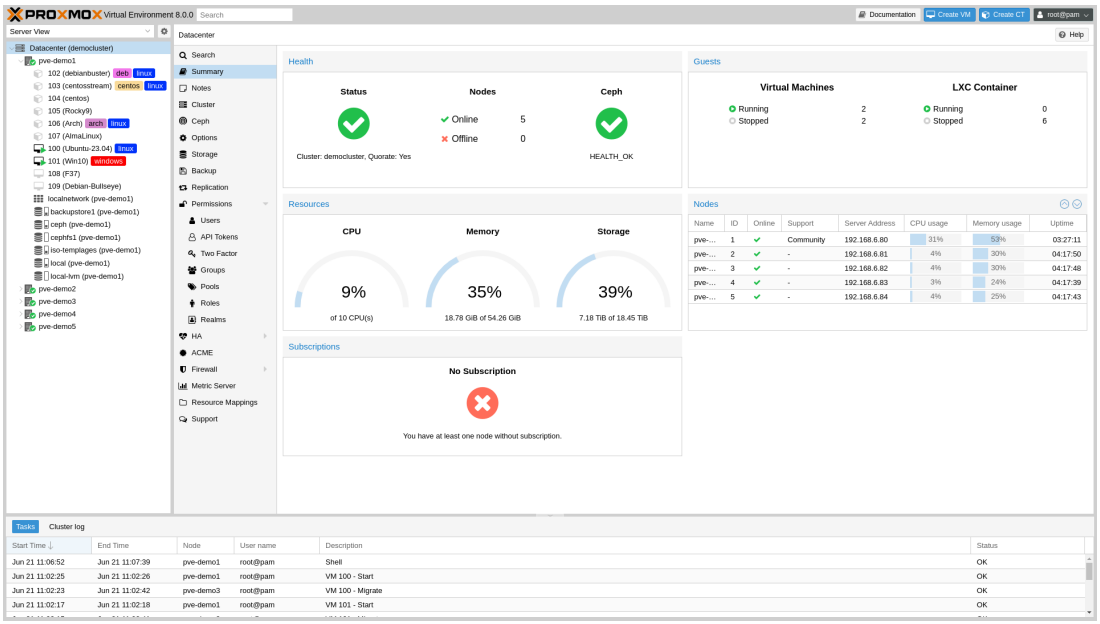


Figure 1-1 Proxmox GUI

2. CONFIGURATION SETTINGS

In this chapter, we will demonstrate how to use XEVO and QSM to create storage in a Proxmox VE environment to deposit VMs. We will also introduce how to create storage using iSCSI / SMB / NFS protocols in the following chapters.

2.1. Recommended Storage

1. Use XCalc. tool on the QSAN website to obtain recommended storages.
2. Enter the **Total Usable Capacity Required** and the desired **RAID Level**.

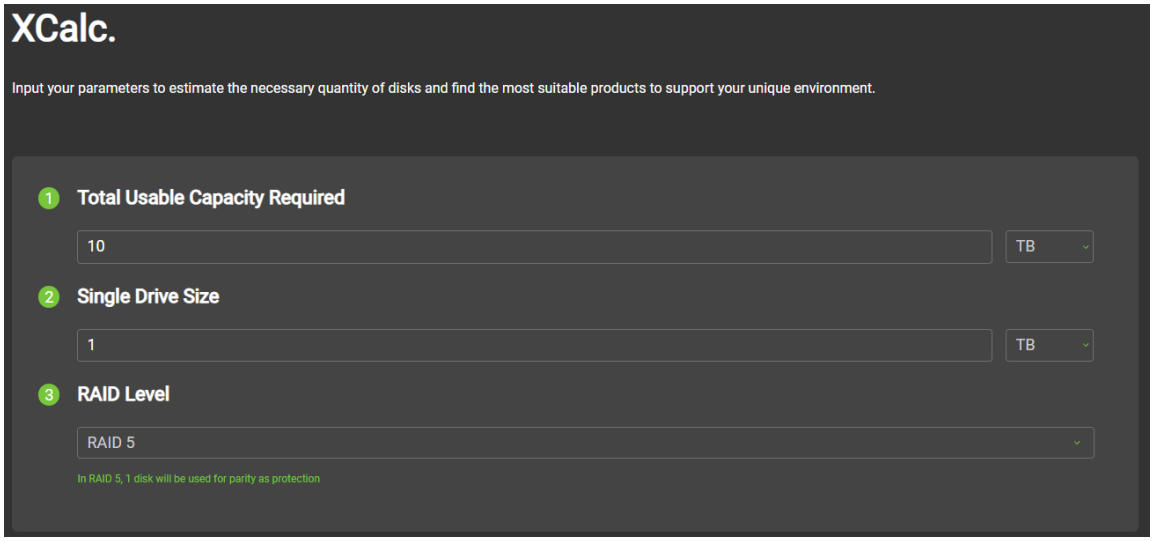


Figure 2-1 Use XCalc. Tool to Obtain Recommended Storages

3. Select the **Virtualization** option.

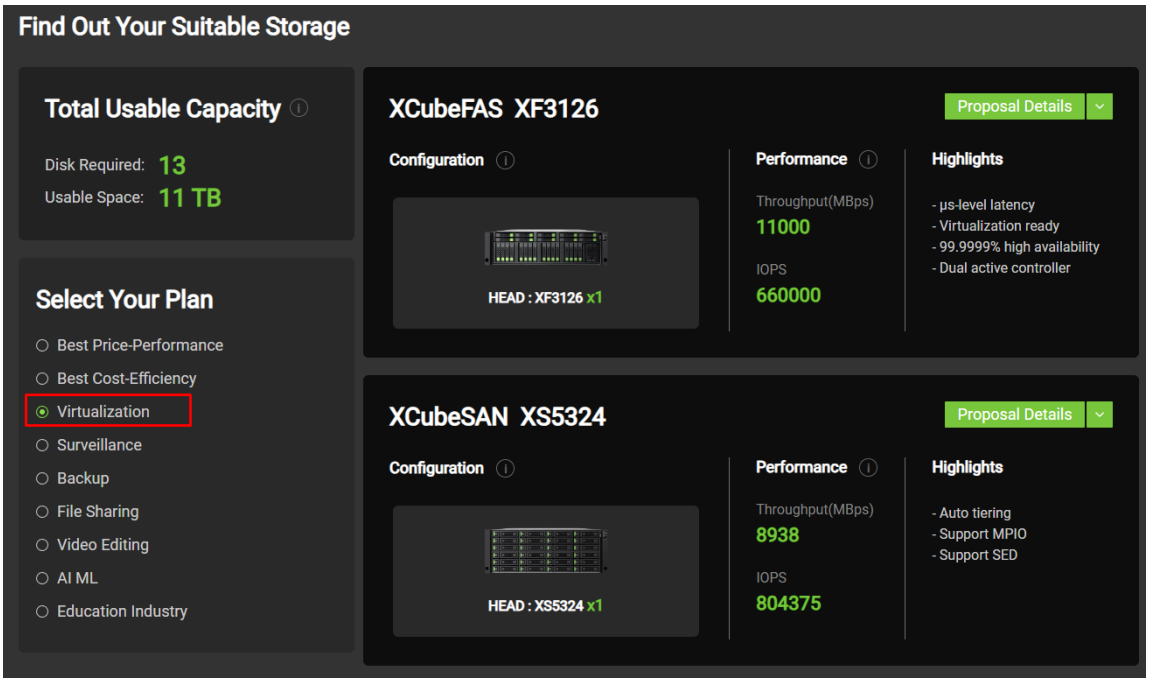


Figure 2-2 Select Virtualization Option

4. Select the model and click the **Proposal Details** button to view more.

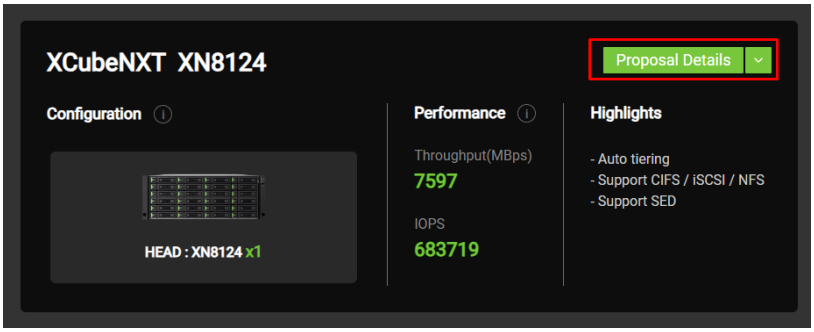


Figure 2-3 Click Proposal Details Button to View More

5. If necessary, click the **Export the Result** button to export the report.

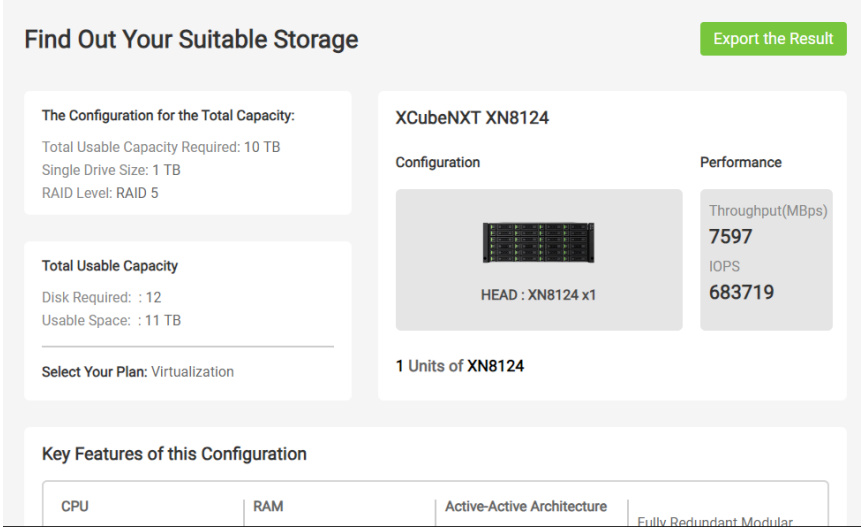


Figure 2-4 Click Export Button to Export Result

2.2. Configuration Steps in XEVO

In this section we will provide an example of setting up iSCSI in XEVO.

2.2.1. Environment and Topology

Demonstration Environment

- Proxmox Server

  Data Port IP: 192.168.252.81

- Storage
  - Model: XCubeSAN 5326D
    Memory: 16 GB per controller
    Firmware: XEVO 2.3.3
    Data Port IP 1: 192.168.175.31
    Data Port IP 2: 192.168.175.32

Demonstration Topology

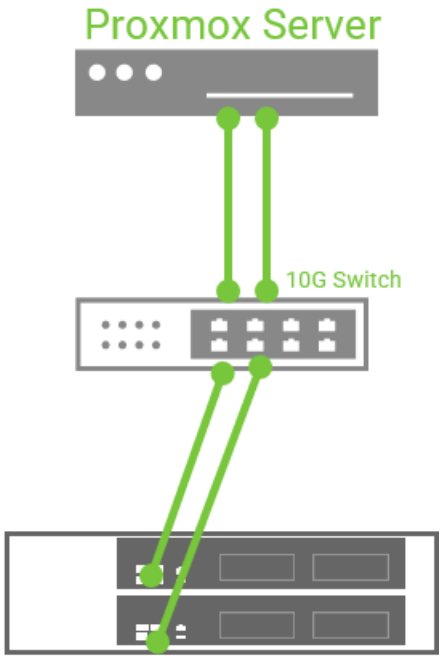


Figure 2-5 Demonstration Topology in XEVO

2.2.2. Configure iSCSI Settings in XEVO

1. Connect the data port IPs 192.168.175.31 and 192.168.175.32 in XEVO and the installed Proxmox server to the same switch, and confirm that they can ping each other.

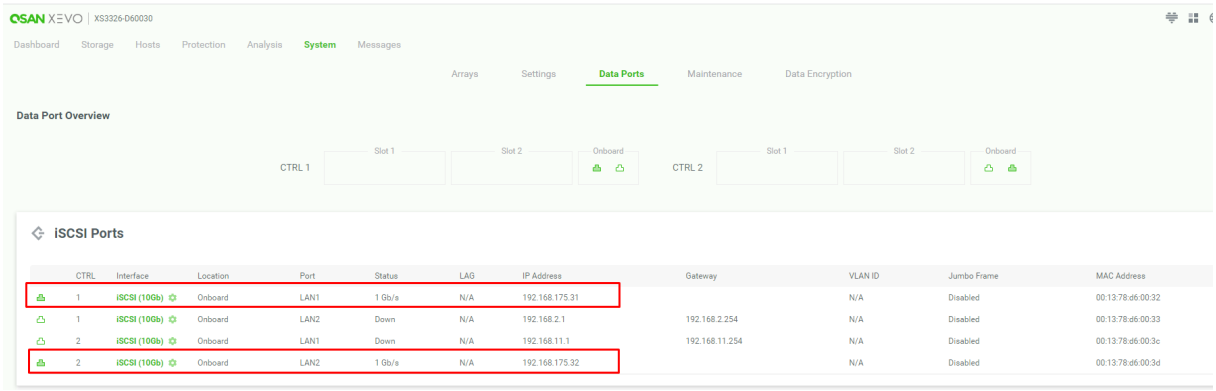


Figure 2-6 Connect Data Ports in XEVO

2. Create a pool, a volume, and a host group; then connect the volume to the host group.

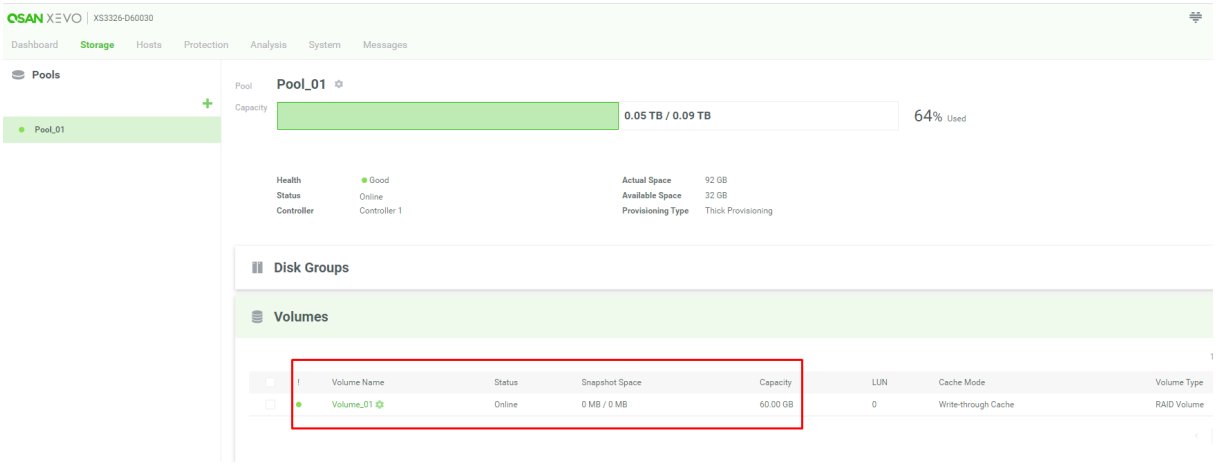


Figure 2-7 Create a Pool and a Volume

3. Login to the Proxmox VE Web UI, enter the editing node “pve” network, and configure the IP address 192.168.175.11/24 and 192.168.175.12/24.

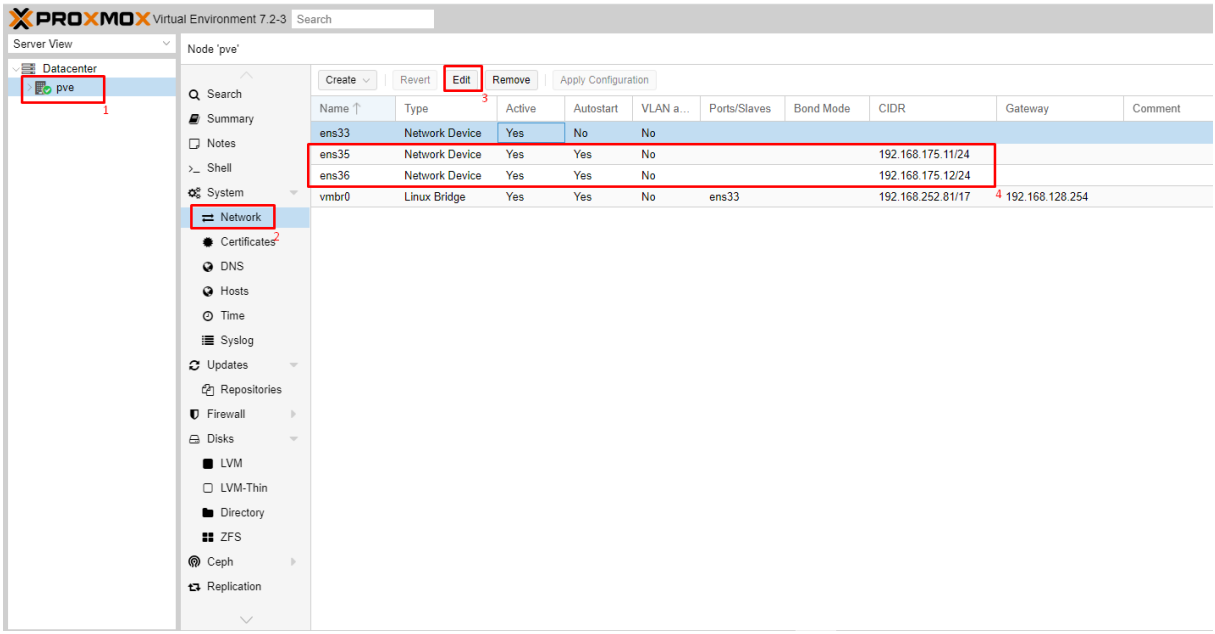


Figure 2-8 Login to Proxmox and Configure

4. **Apply Configuration** tab enables the above settings.

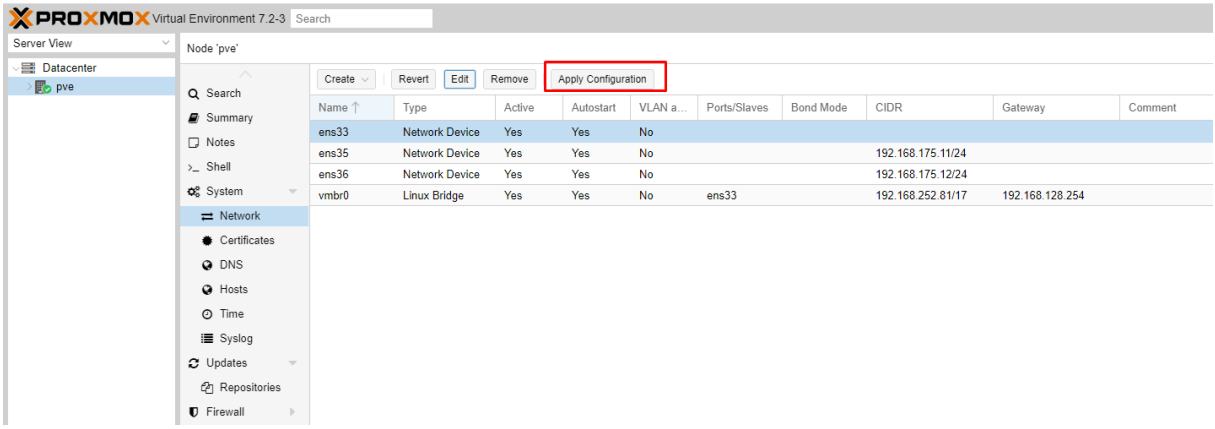


Figure 2-9 Enables Settings

5. Login to the Proxmox via SSH, and verify that they can ping the XEVO IPs set previously.

```
root@pve:~# ping 192.168.175.31
PING 192.168.175.31 (192.168.175.31) 56(84) bytes of data.
64 bytes from 192.168.175.31: icmp_seq=1 ttl=64 time=0.328 ms
64 bytes from 192.168.175.31: icmp_seq=2 ttl=64 time=0.390 ms
64 bytes from 192.168.175.31: icmp_seq=3 ttl=64 time=0.384 ms
64 bytes from 192.168.175.31: icmp_seq=4 ttl=64 time=0.385 ms
64 bytes from 192.168.175.31: icmp_seq=5 ttl=64 time=0.392 ms
^C
--- 192.168.175.31 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4050ms
rtt min/avg/max/mdev = 0.328/0.375/0.392/0.024 ms
root@pve:~#
root@pve:~#
root@pve:~# ping 192.168.175.32
PING 192.168.175.32 (192.168.175.32) 56(84) bytes of data.
64 bytes from 192.168.175.32: icmp_seq=1 ttl=64 time=0.299 ms
64 bytes from 192.168.175.32: icmp_seq=2 ttl=64 time=0.386 ms
64 bytes from 192.168.175.32: icmp_seq=3 ttl=64 time=0.522 ms
64 bytes from 192.168.175.32: icmp_seq=4 ttl=64 time=0.431 ms
^C
--- 192.168.175.32 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3033ms
rtt min/avg/max/mdev = 0.299/0.409/0.522/0.080 ms
```

Figure 2-10 Login to Proxmox and Ping

6. Go to the Datacenter of the Storage, then click the **Add** tab and select the **iSCSI** option.

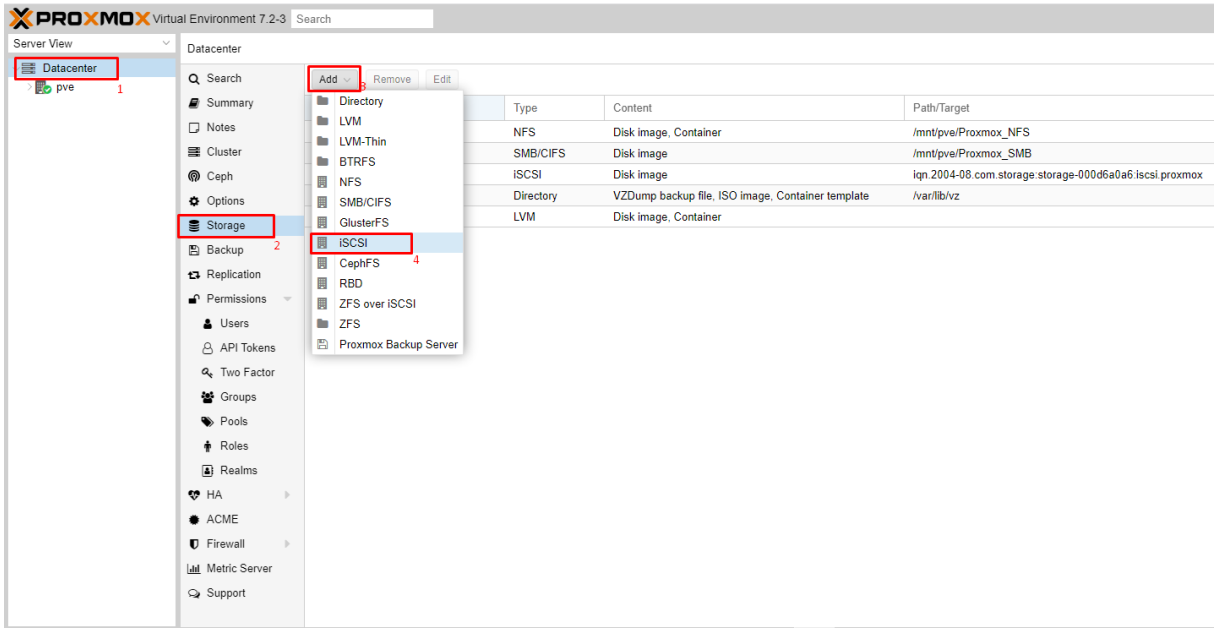
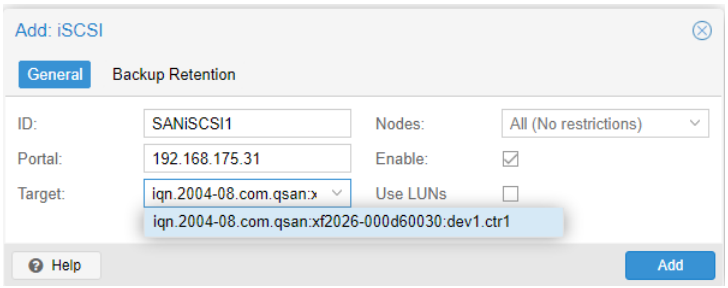


Figure 2-11 Select iSCSI Option to Configure

7. Enter the **ID**, **Portal IP**, and select the **Target** which you just created. Note that **Use LUNs** needs to be unchecked.



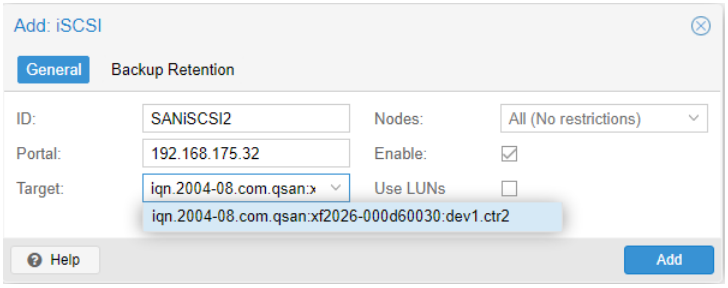


Figure 2-12 Configure iSCSI Settings

8. After clicking the **Add** button, you can go to the storage page to confirm the storage settings.

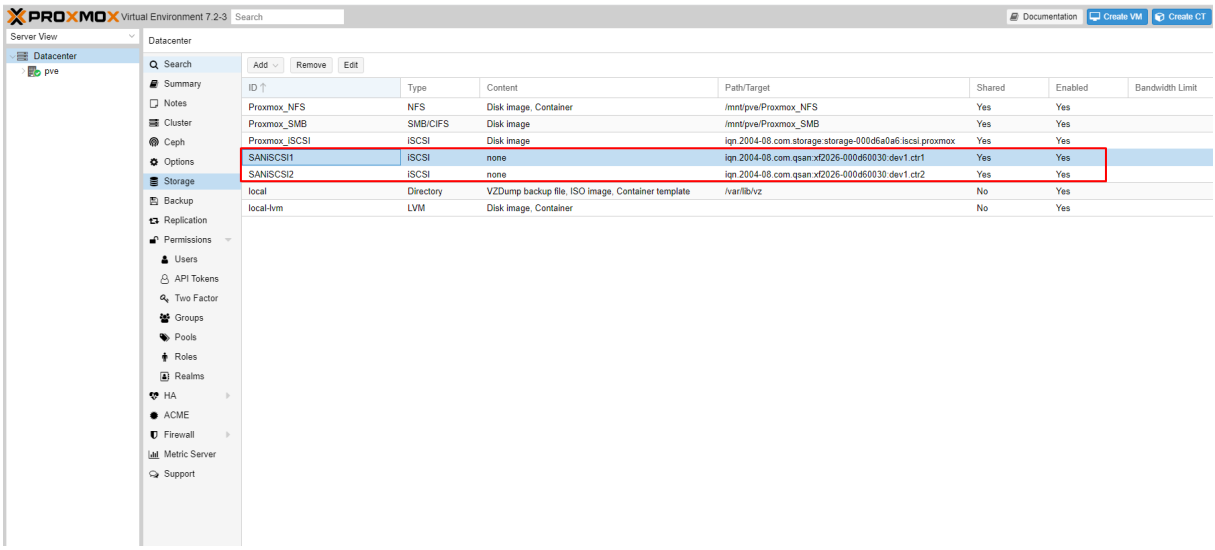


Figure 2-13 Check iSCSI Settings

9. Connect to Proxmox via SSH and enter the commands to download the multipath-tools.

```
# apt updat
# apt install multipath-tools
```

10. Enter the command "fdisk -l" to confirm the mounted iSCSI drive location.

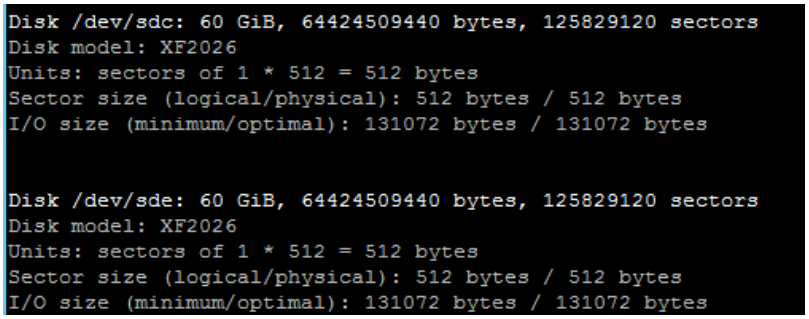


Figure 2-14 Confirm Mounted iSCSI Drive Location

11. Enter the command "iscsiadm -m session" to confirm that there are two sessions.

```
root@pve:/# iscsiadm -m session
tcp: [10] 192.168.175.31:3260,1 iqn.2004-08.com.qsan:xf2026-000d60030:dev1.ctr1 (non-flash)
tcp: [11] 192.168.175.32:3260,1 iqn.2004-08.com.qsan:xf2026-000d60030:dev1.ctr2 (non-flash)
```

Figure 2-15 Confirm iSCSI Sessions

12. Enter the command "service multipathd start " to enable multipath function. And use the command "cd /etc/" to enter the etc directory.
13. Enter the command "multipath -ll" to record the wwid as shown in the picture below, and when MPIO has not been enabled, the status is active and enable.

```
root@pve:/etc# multipath -ll
proxmox1 (3200b0013780e8c40) dm-7 QSAN,XF2026
size=60G features='0' hwhandler='1 alua' wp=rw
|-+- policy='service-time 0' prio=50 status=active
| `- 3:0:0:5 sdc 8:32 active ready running
`-+- policy='service-time 0' prio=50 status=enabled
  `- 4:0:0:5 sde 8:64 active ready running
```

Figure 2-16 Check MPIO Status

14. Enter the command "vi multipath.conf" to edit the MPIO policy.

```
defaults {

        user_friendly_names yes

}

devices {
        device {
                vendor                  "QSAN"
                //cat /sys/block/sdx/device/vender
                product                 "XF2026"
                //cat /sys/block/sdx/device/model
                path_grouping_policy    multibus
                path_selector           "round-robin 0"
                failback                immediate
                rr_weight               priorities
                no_path_retry           5
                rr_min_io               1
        }
}

multipaths {
        multipath {
                wwid 3200b0013780e8c40
                alias proxmox1
        }

}
```

Figure 2-17 Edit the MPIO policy

15. Enter the command "service multipathd restart" to apply multipath.conf setting.
16. Enter the command "multipath -ll" to check MPIO enable successfully. It can be found that the status of both paths has become active.

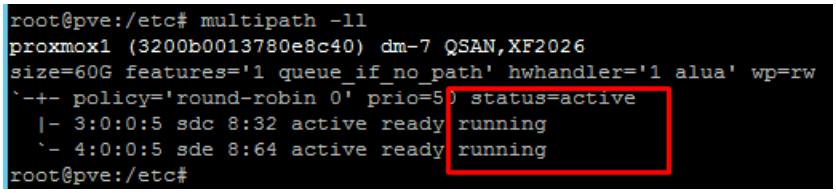


Figure 2-18 Check MPIO Status

17. Back to the Proxmox web UI, and then go to the Datacenter of the Storage, click the **Add** tab and select the **LVM** option.

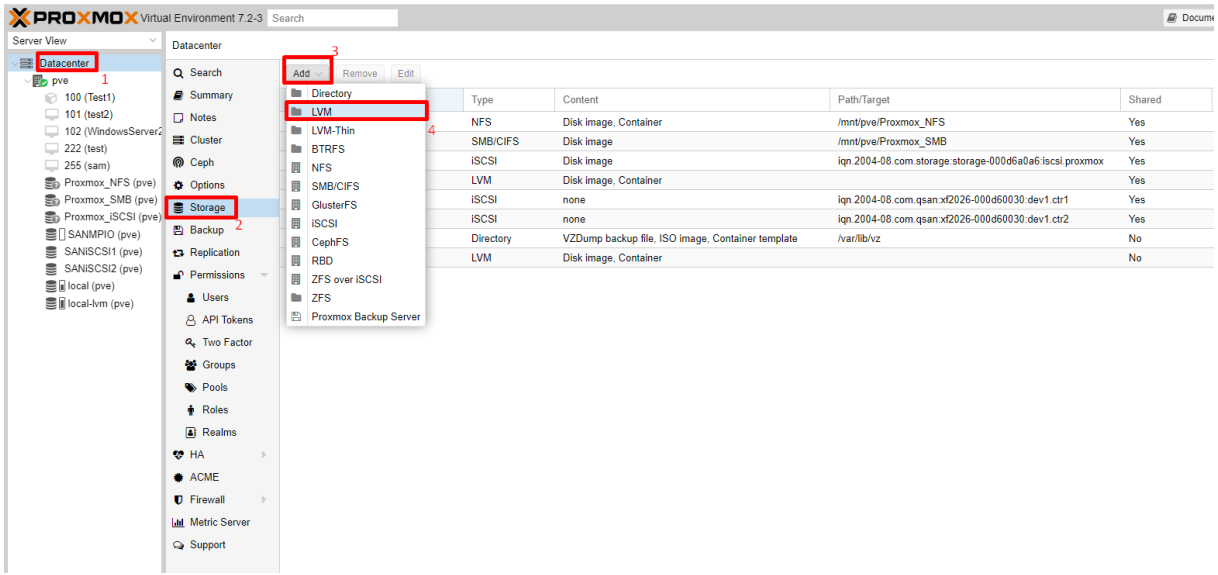


Figure 2-19 Select LVM Option to Configure

18. Enter the **ID**, select the **Base storage**, **Base volume**, and enter the **Volume group** name. Finally, check the Shared option.

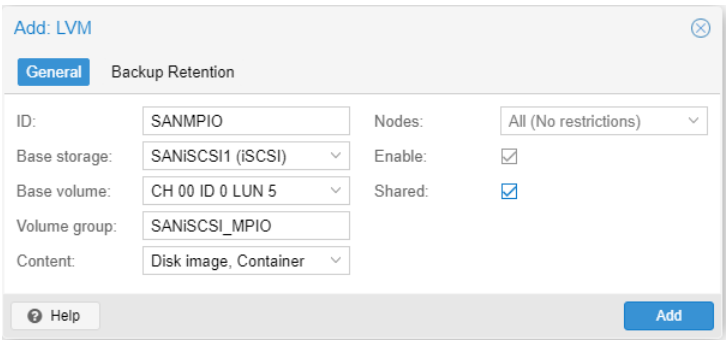


Figure 2-20 Configure LVM Settings

19. After clicking the **Add** button, you can go to the storage page to confirm the storage settings.

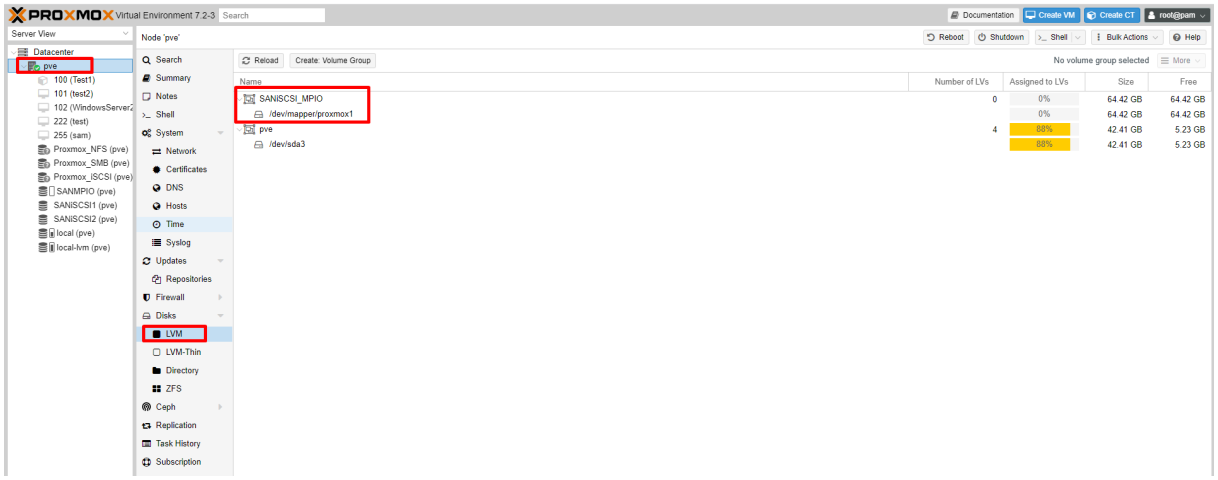


Figure 2-21 Check LVM Settings

20. Click the **Create VM** button at the upper right corner. Now you can select the storage setting in the **Disk** tab to create a VM.

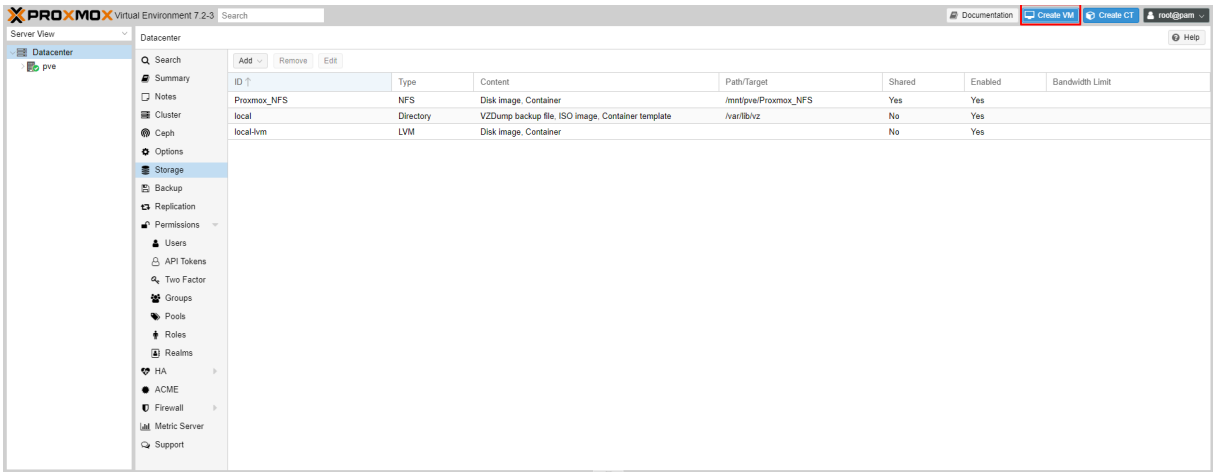


Figure 2-22 Click Create VM button

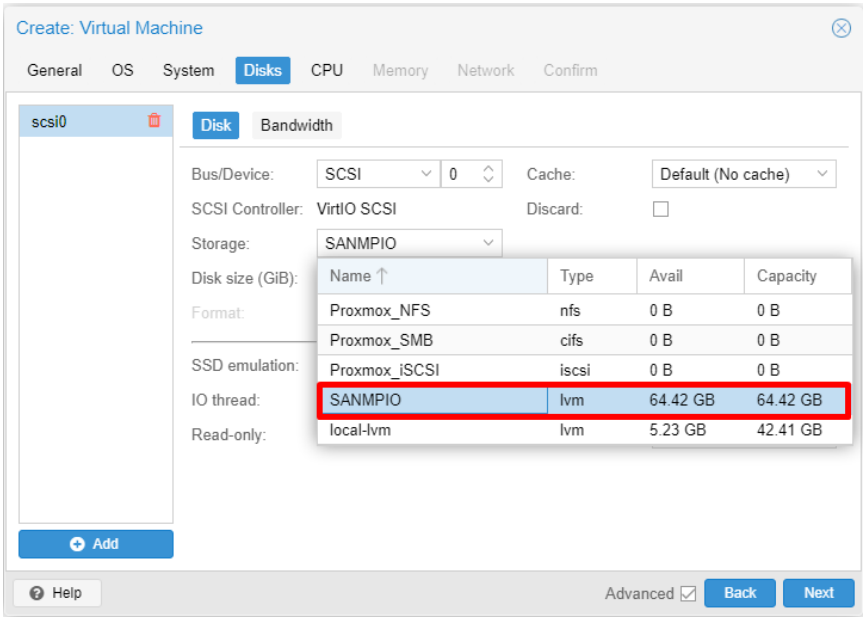


Figure 2-23 Create a VM via an iSCSI Drive

2.3. Configuration Steps in QSM

In this section we will provide an example of setting up iSCSI in QSM.

2.3.1. Environment and Topology

Demonstration Environment

- Proxmox Server

  Data Port IP: 192.168.252.81

- Storage
  - Model: XCubeNXT 8126D
    Memory: 16 GB per controller
    Firmware: QSM 4.0.1
    Cluster IP: 192.168.138.109
    Private IP 1: 192.168.175.41
    Private IP 2: 192.168.175.42

Demonstration Topology

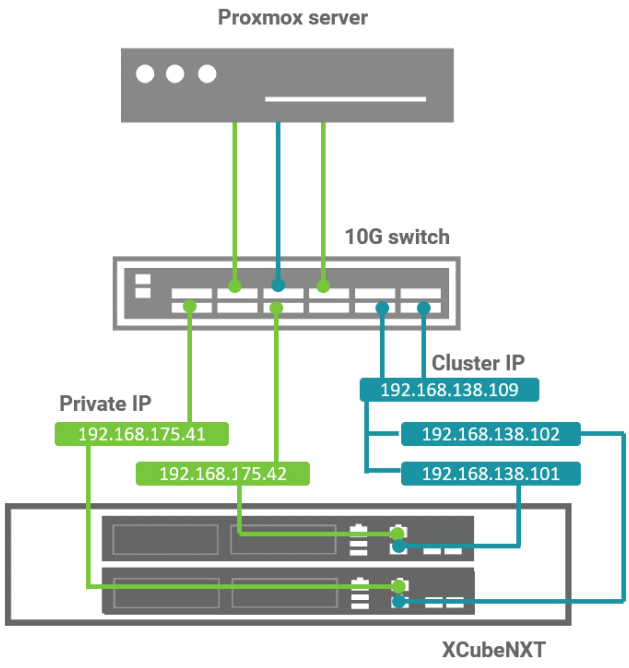


Figure 2-24 Demonstration Topology in QSM

2.3.2. Configure SMB / CIFS Settings in QSM

1. Create a share folder named "Proxmox_SMB".

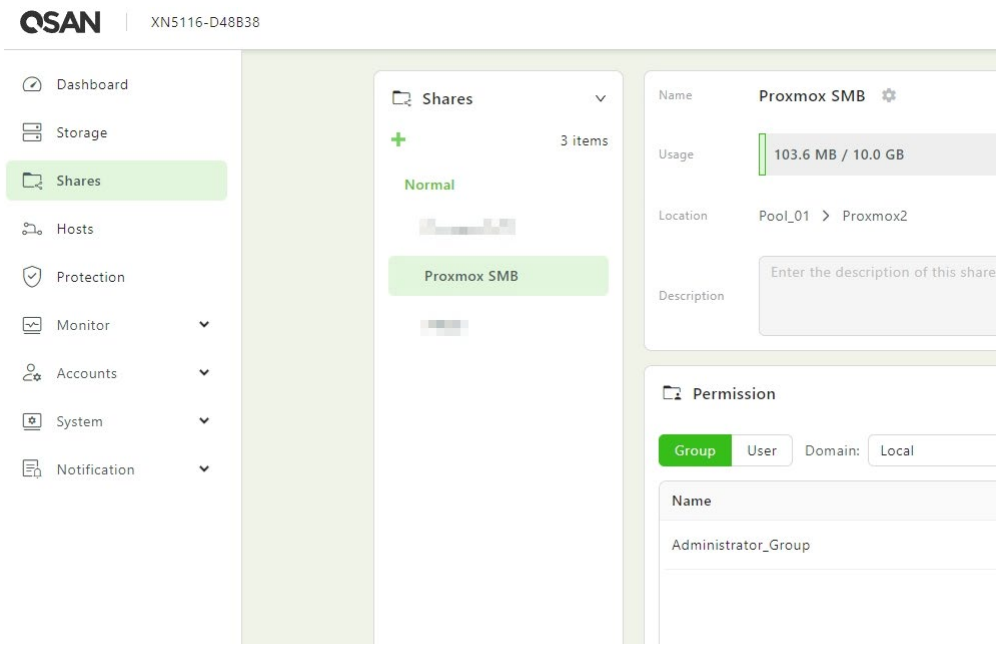


Figure 2-25 Create a Shared Folder

2. Create a Share Host.
3. Login to the Proxmox VE Web UI, and go to the Datacenter of the Storage, then click the **Add** tab and select the **SMB/CIFS** option.

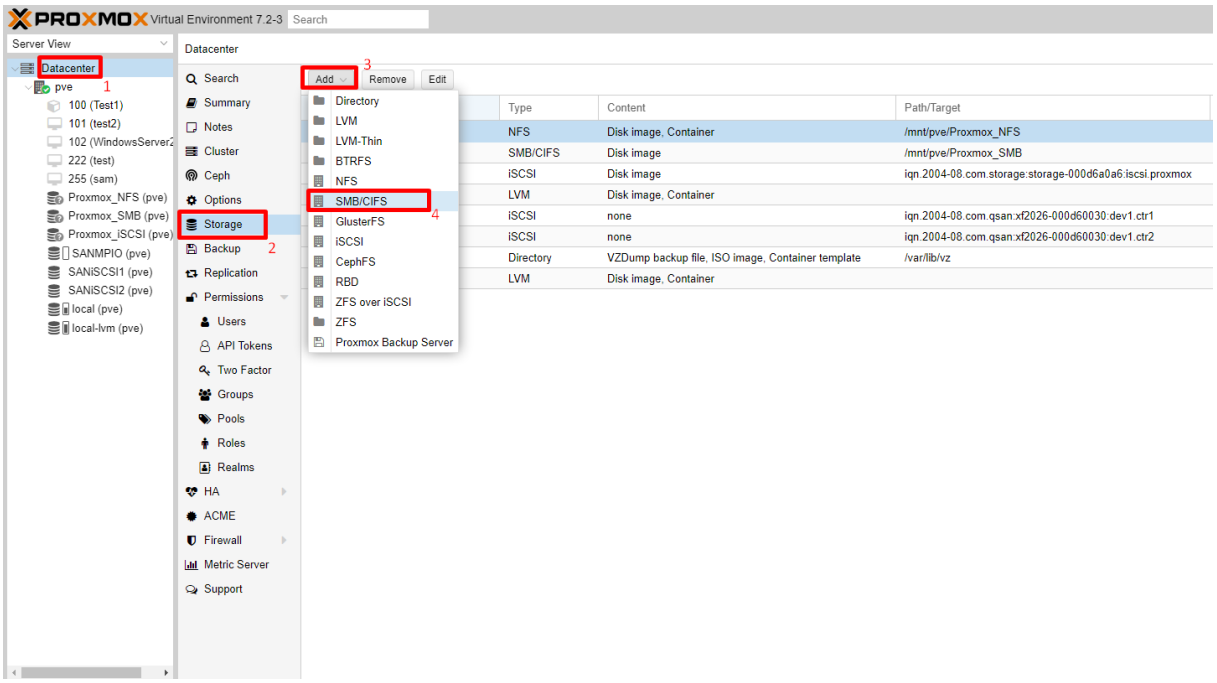


Figure 2-26 Select SMB/CIFS Option to Configure

4. Enter the **ID**, **Server IP** (i.e. cluster IP), **Username**, **Password**, and select the **Share** folder you just created.

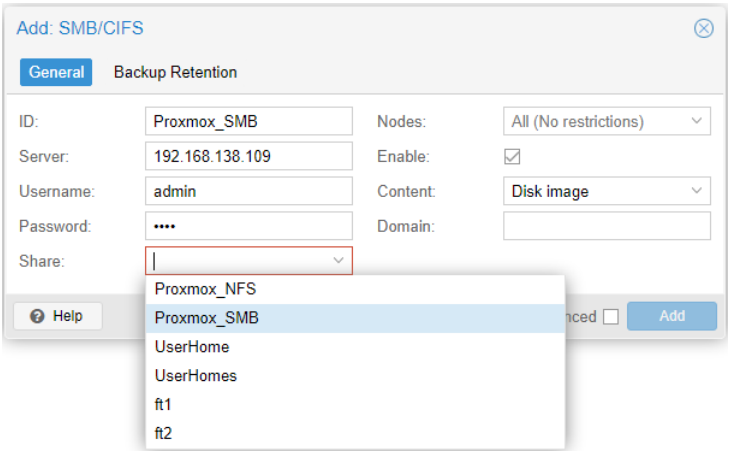


Figure 2-27 Configure SMB / CIFS Settings

5. After clicking the **Add** button, you can go to the storage page to confirm the storage settings.

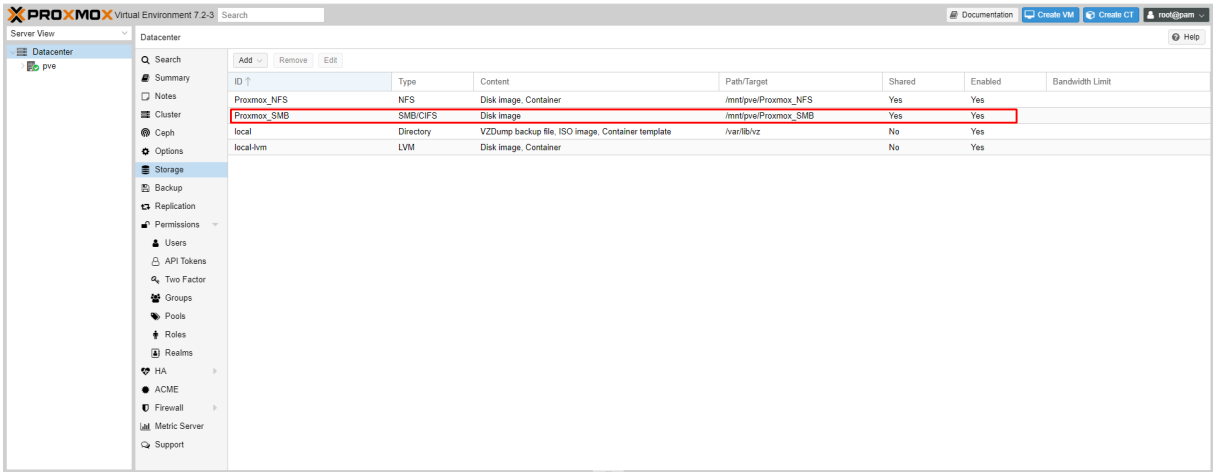


Figure 2-28 Check SMB / CIFS Settings

6. Click the **Create VM** button at the upper right corner. Now you can select the storage setting in the **Disk** tab to create a VM.

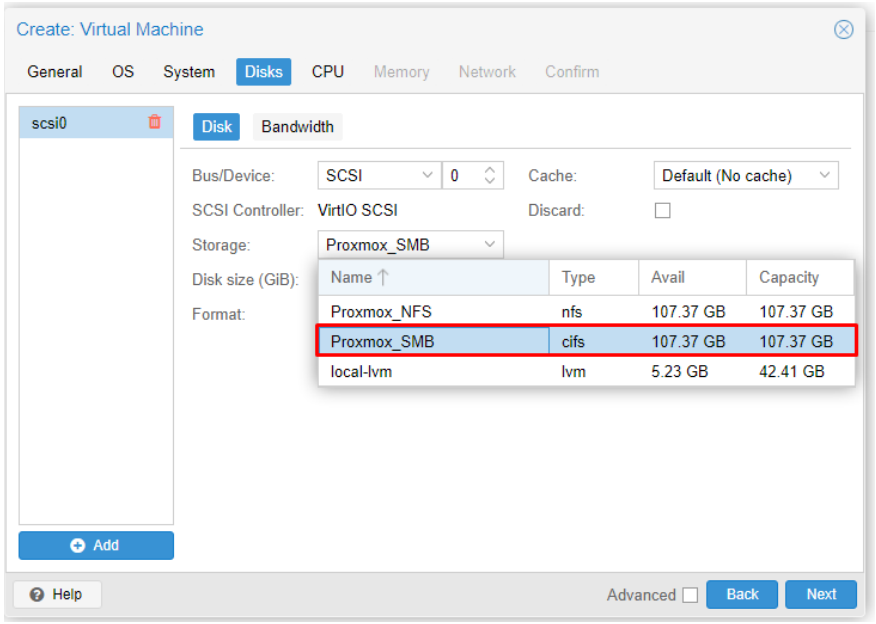


Figure 2-29 Create a VM via an SMB Shared Folder

2.3.3. Configure NFS Settings in QSM

1. Connect the cluster IP 192.169.138.109 in QSM and the installed Proxmox server to the same switch, and confirm that the IP addresses of QSM can be pinged.
2. Create a share folder named "Proxmox_NFS".

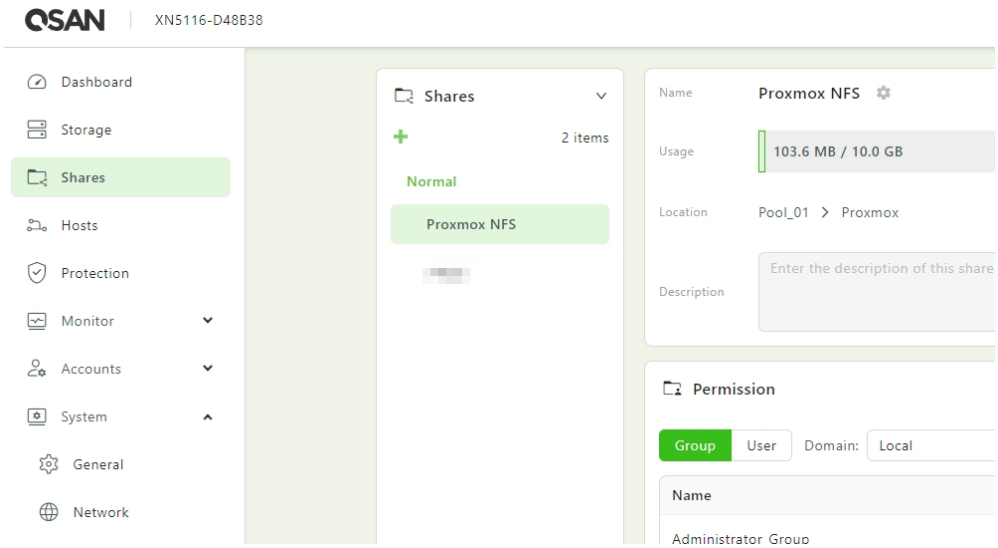


Figure 2-30 Create a Shared Folder

3. Add the IP address of Proxmox server to the NFS host.
4. Login to the Proxmox VE Web UI, and go to the Datacenter of the Storage, then click the **Add** tab and select the **NFS** option.

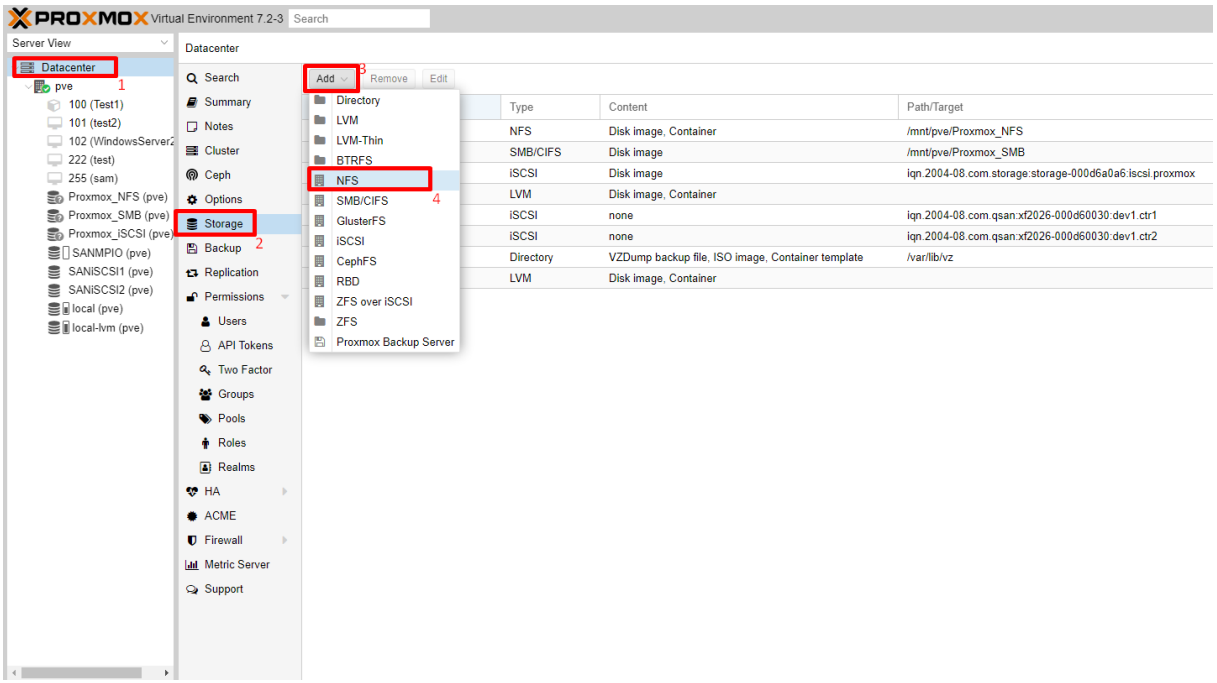


Figure 2-31 Select NFS Option to Configure

5. Enter the **ID**, **Server IP** (i.e. cluster IP) and then select the **Export** folder you just created. Finally, select the default **Content** as “Disk image”.

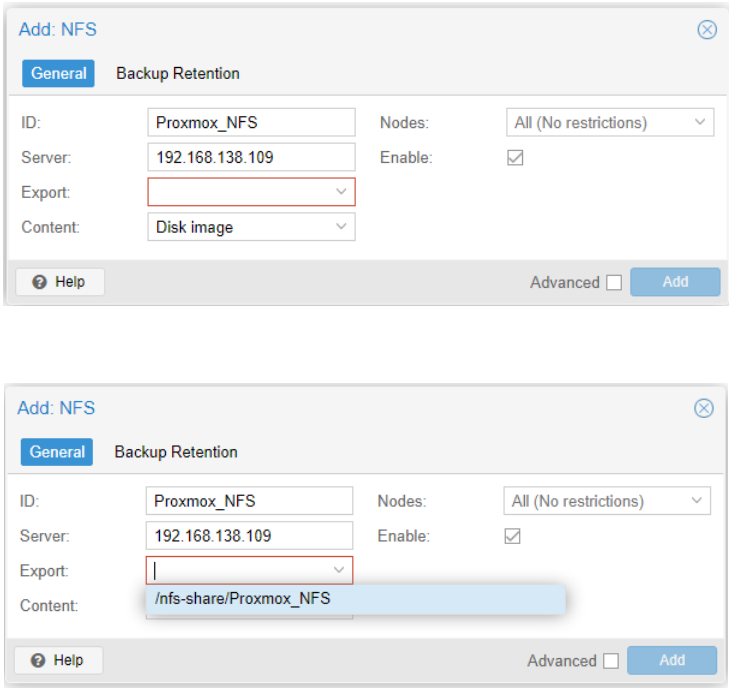


Figure 2-32 Configure NFS Settings

6. After clicking the **Add** button, you can go to the storage page to confirm the storage settings.

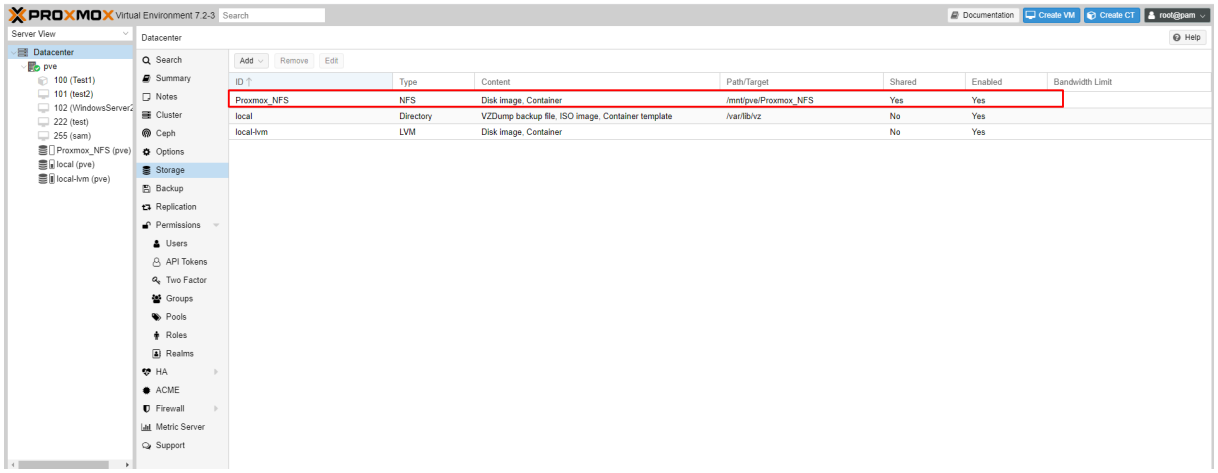


Figure 2-33 Check NFS Settings

7. Click the **Create VM** button at the upper right corner. Now you can select the storage setting in the **Disk** tab to create a VM.

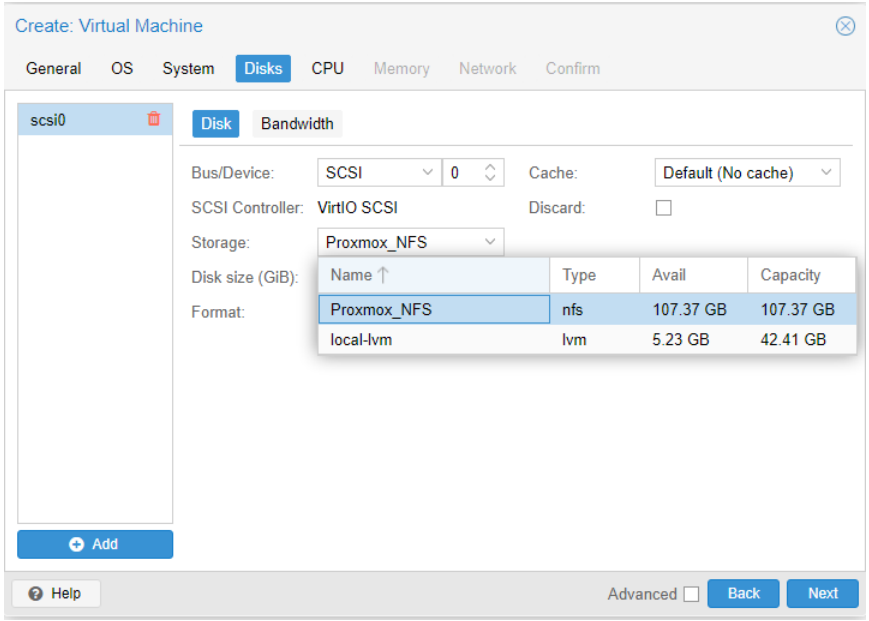


Figure 2-34 Create a VM via an NFS Shared Folder

2.3.4. Configure iSCSI Settings in QSM

1. Connect the private IPs 192.168.175.41 and 192.168.175.42 in QSM and the installed Proxmox server to the same switch, and confirm that they can ping each other.

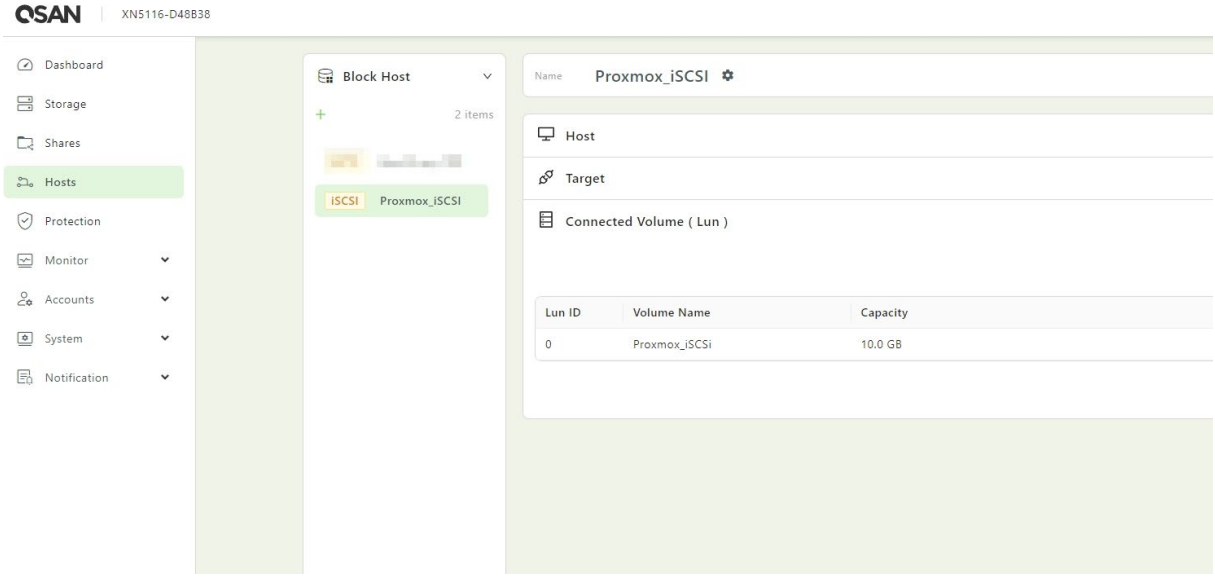


Figure 2-35 Create a Target and Connect to a Volume

2. Create a target and connect to a volume, and note the IQNs of the controller 1 and controller 2.

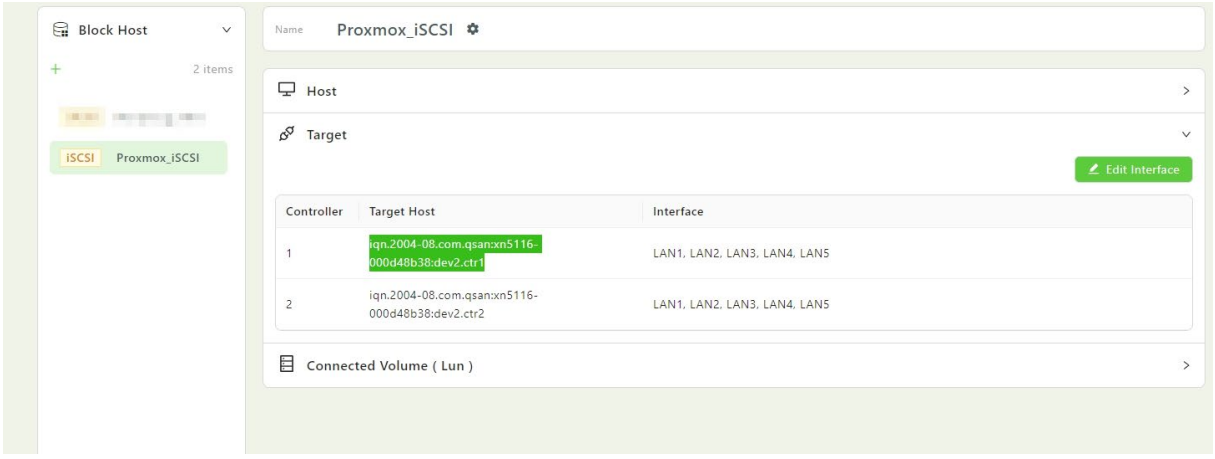


Figure 2-36 Note IQNs of Controller 1 and Controller 2

3. Since the following configuration will be the same as iSCSI setting in XEVO. Please refer to the Step 3 to Step 20 in the Section 2.2 Configuration Steps for XEVO to create a VM through QSM iSCSI.

2.4. Configuration Steps for Cluster with NFS

In this section, we will demonstrate setting up a demo using three Proxmox hosts and an unified storage to establish an NFS share. This NFS share can then be mounted to a Proxmox cluster environment for deploying Linux or Windows VMs. The setup is designed to showcase the application of VMs with redundancy features, providing insights into achieving HA (High Availability) and efficient data management in a virtualized infrastructure.

2.4.1. Environment and Topology

Demonstration Environment

- Proxmox Server
  - Model: 3 x ASUS Server
    OS: Proxmox VE 8.1.4
    Server 1 IP: 192.168.203.220
    Server 2 IP: 192.168.203.222
    Server 3 IP: 192.168.203.223
- Storage
  - Model: XN5116S
    Memory: 16 GB per controller
    Firmware: QSM 4.0.2
    Data Port IP: 192.168.195.1

Demonstration Topology

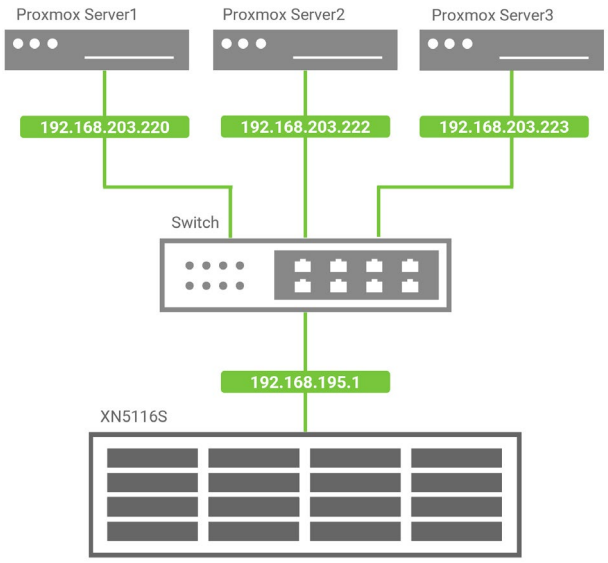


Figure 2-37 Demonstration Topology for HA

2.4.2. Configuration Storage

1. Create a pool and a file volume, then create and add an NFS share to the shared host.

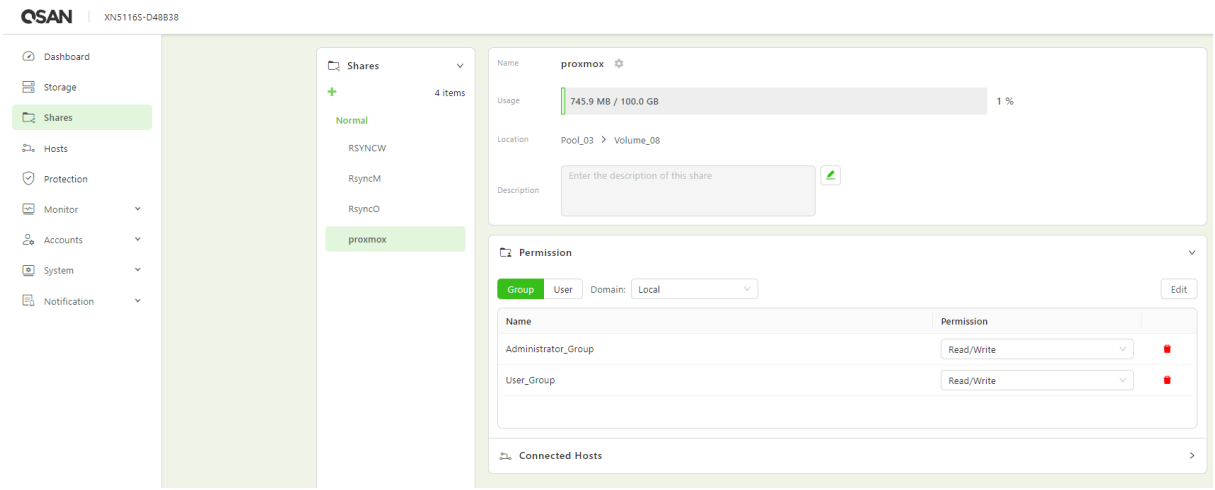


Figure 2-38 Create a Pool and a NFS shared

2.4.3. Configuration Proxmox

1. Visit one of the Proxmox servers and navigate to the **Cluster** menu to create a cluster.

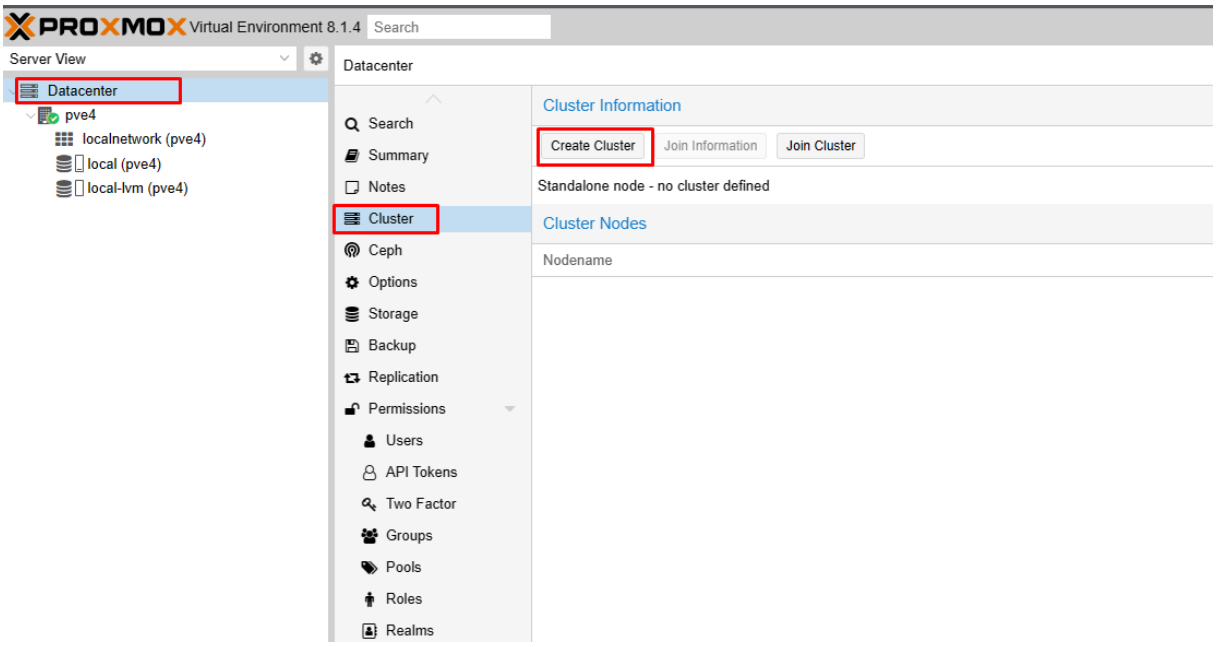


Figure 2-39 Create Cluster Step 1

2. Enter a cluster name and select a cluster network.

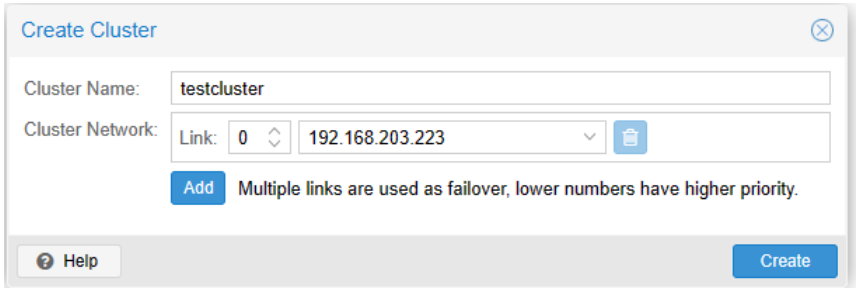


Figure 2-40 Create Cluster Step 2

3. After creating the cluster, click the **Join Information** tab.

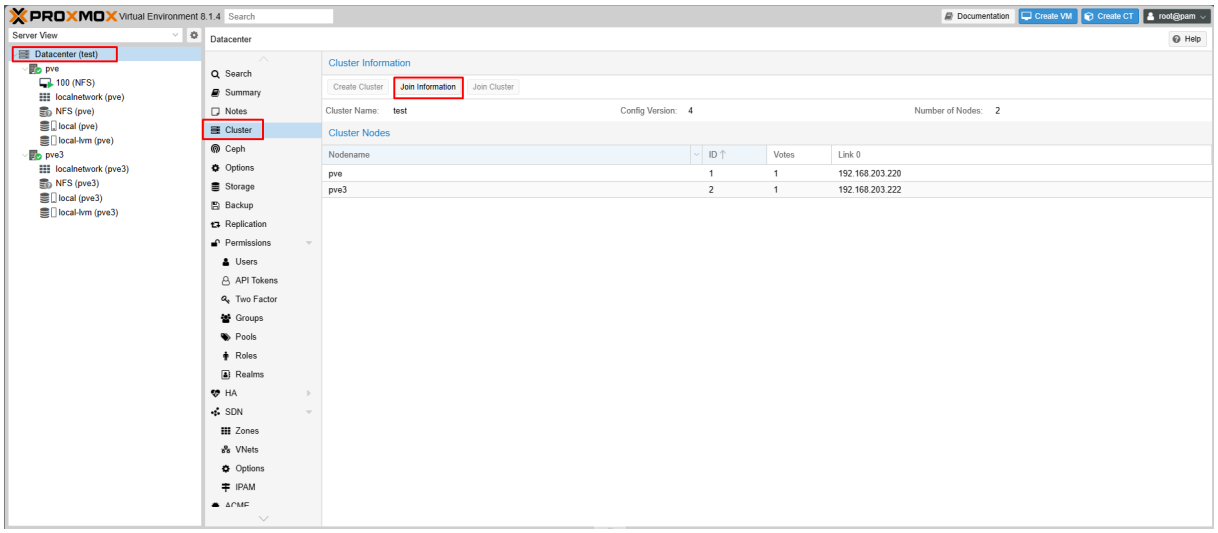


Figure 2-41 Join Information Tab

4. Click the **Copy Information** button to copy the join information.

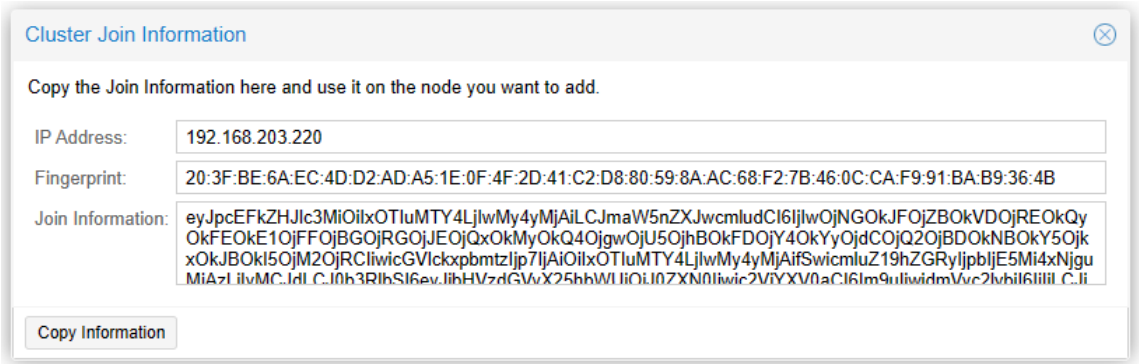


Figure 2-42 Copy Join Information

5. Navigate to the other Proxmox server you want to join the cluster and click the **Join Cluster** tab.

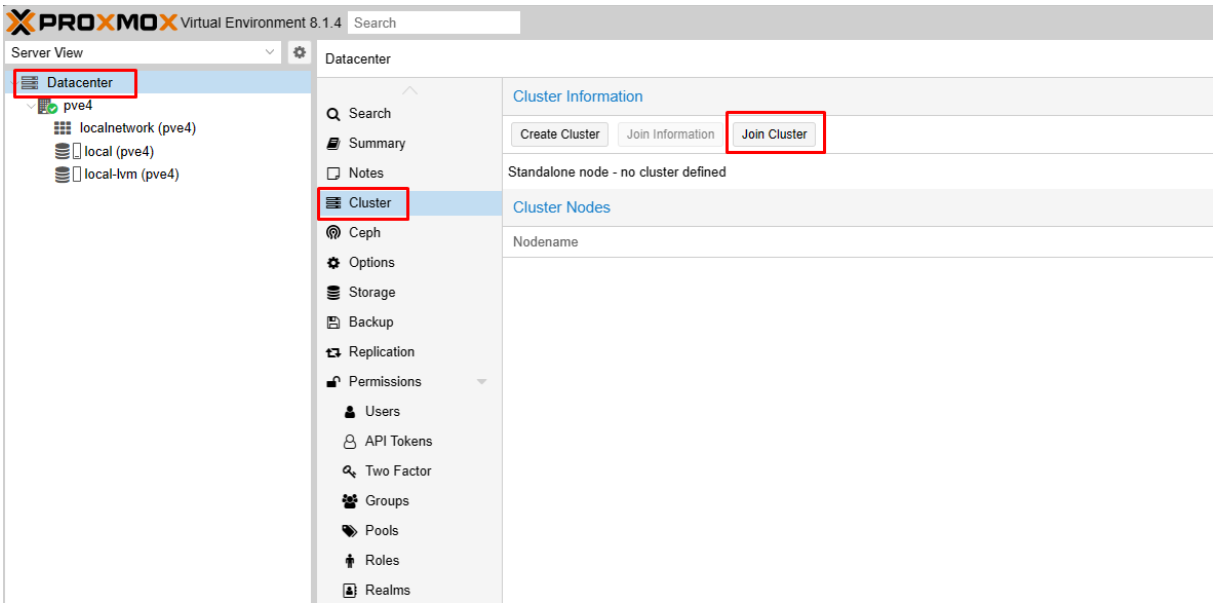


Figure 2-43 Join Cluster Step 1

6. Paste the **Joining Information** and enter the password of the cluster node to successfully join the cluster.

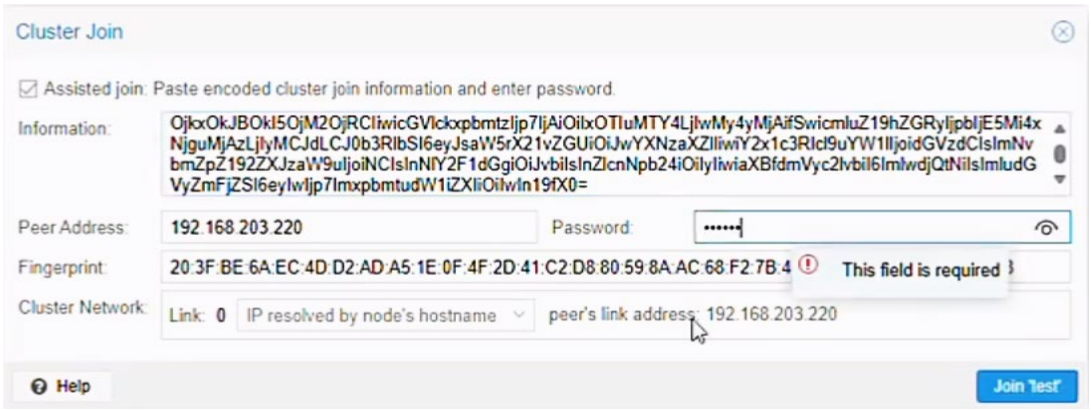


Figure 2-44 Join Cluster Step 2

7. Repeat steps 5 and 6 on the Proxmox server that is not yet in the cluster. Once added, the settings will look like the image below.

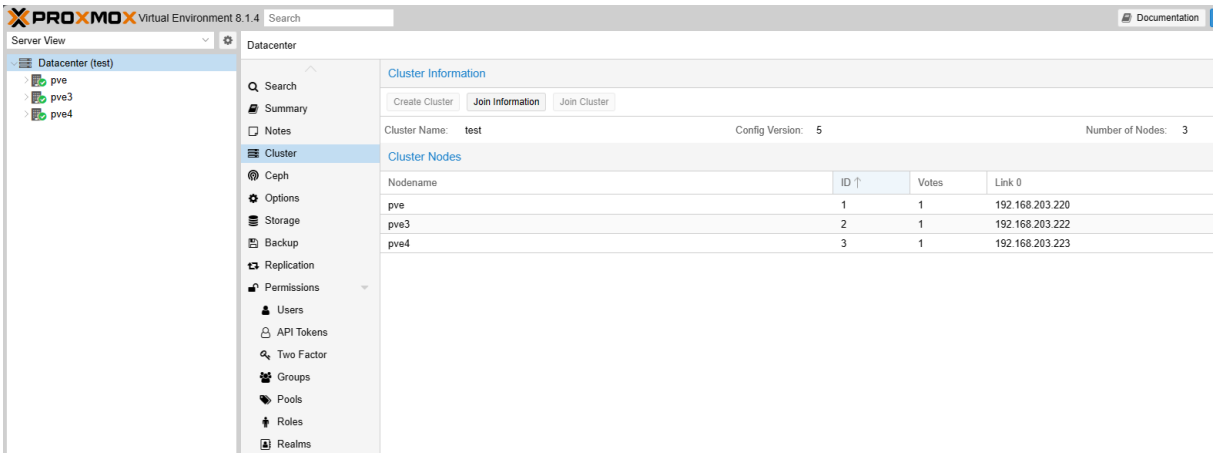


Figure 2-45 Proxmox Cluster Configuration

8. Go to the **Storage** menu of the datacenter and create an NFS share.

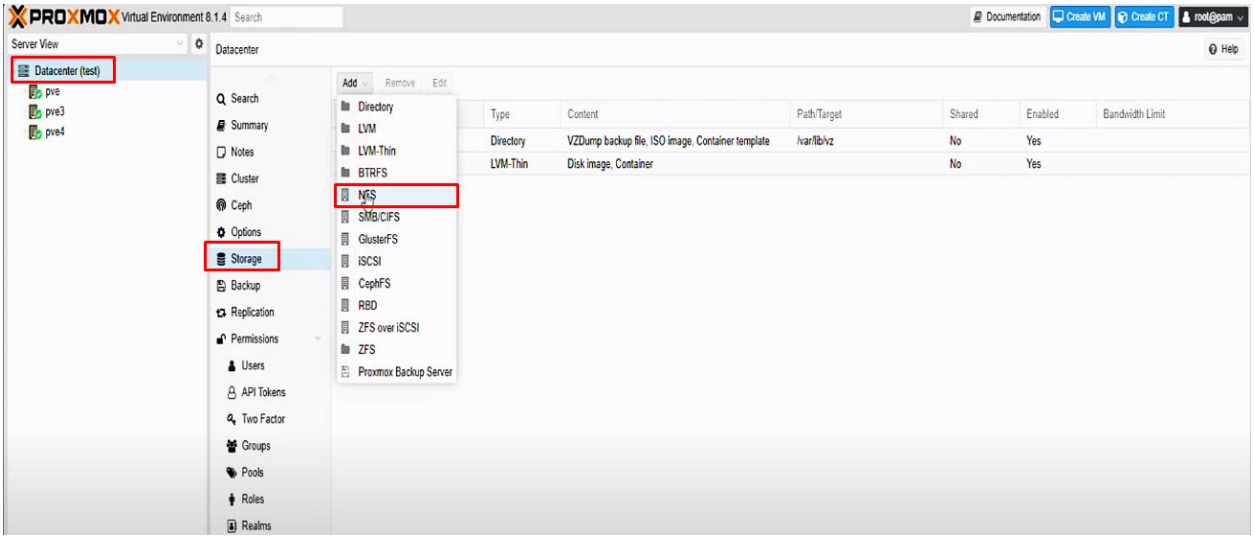


Figure 2-46 Create an NFS Share Step 1

9. Enter the ID and storage IP in the server fields, then select the NFS share you created in the export options.

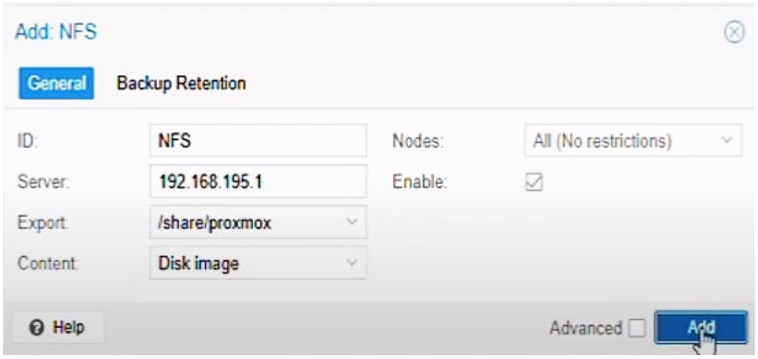


Figure 2-47 Create an NFS Share Step 2

10. After the setup is complete, make sure that all nodes have NFS storage.

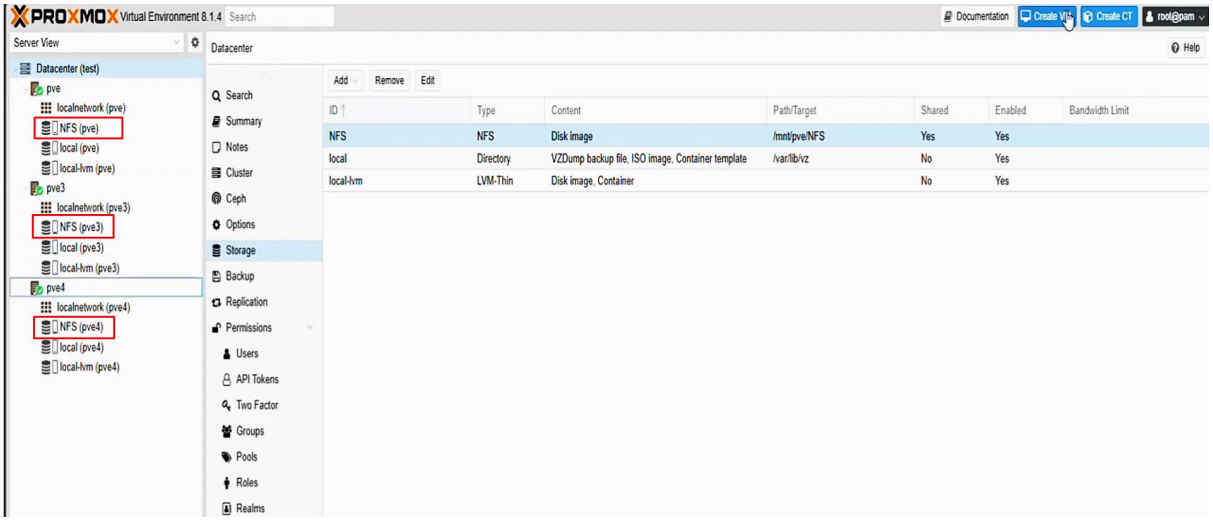


Figure 2-48 Create an NFS Share Step 3

11. Create a VM using NFS storage.

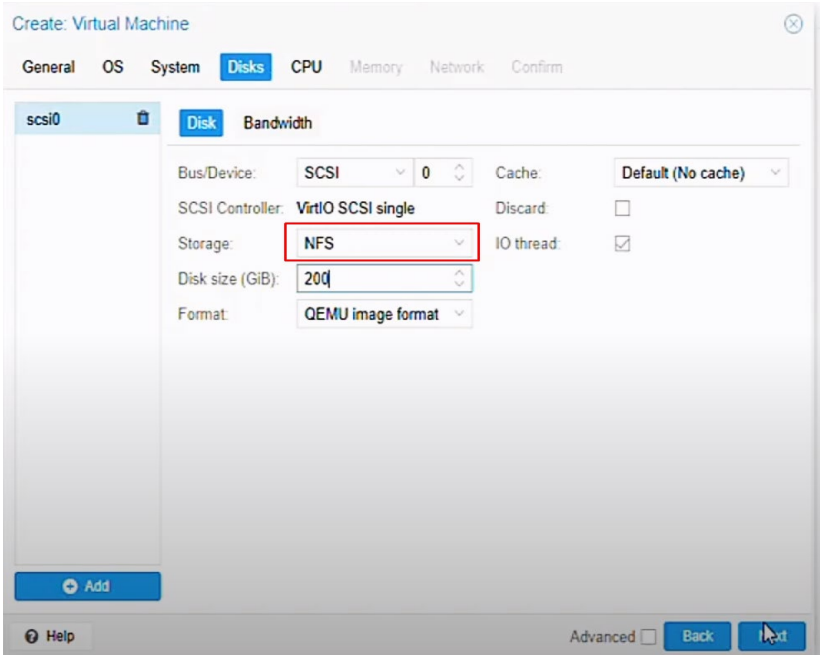


Figure 2-49 Create a VM

12. After the VM is created, the HA status is displayed as **None**, indicating that the HA function has not been enabled on the VM.

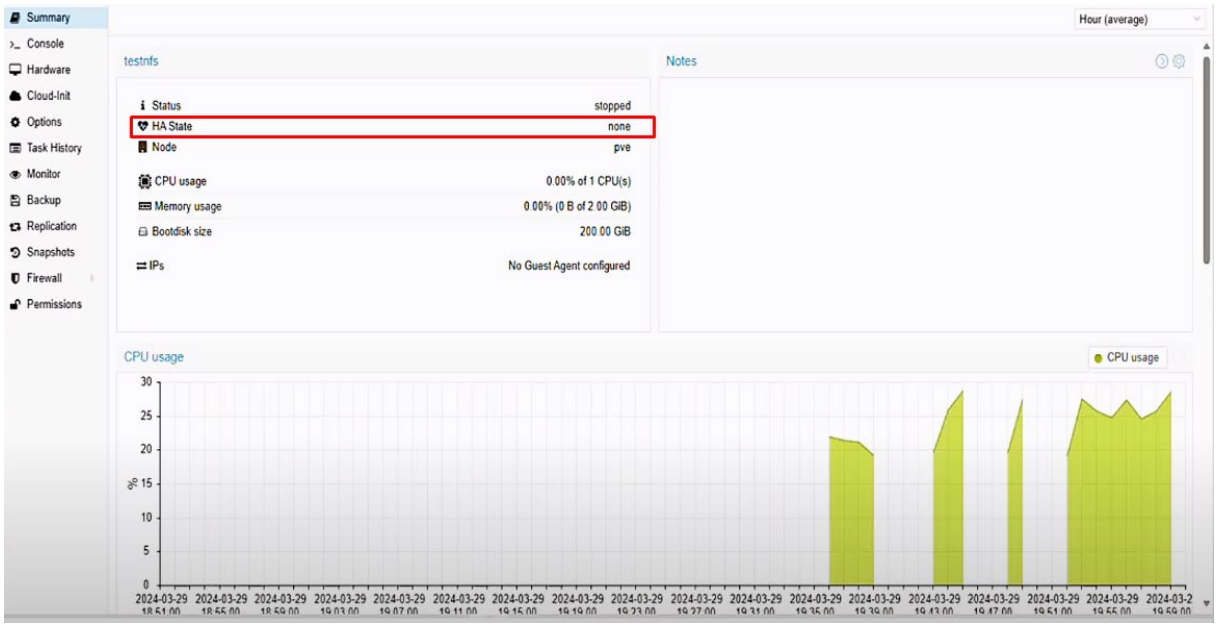


Figure 2-50 Check HA State

13. Navigate to the **Groups** submenu and create a group.

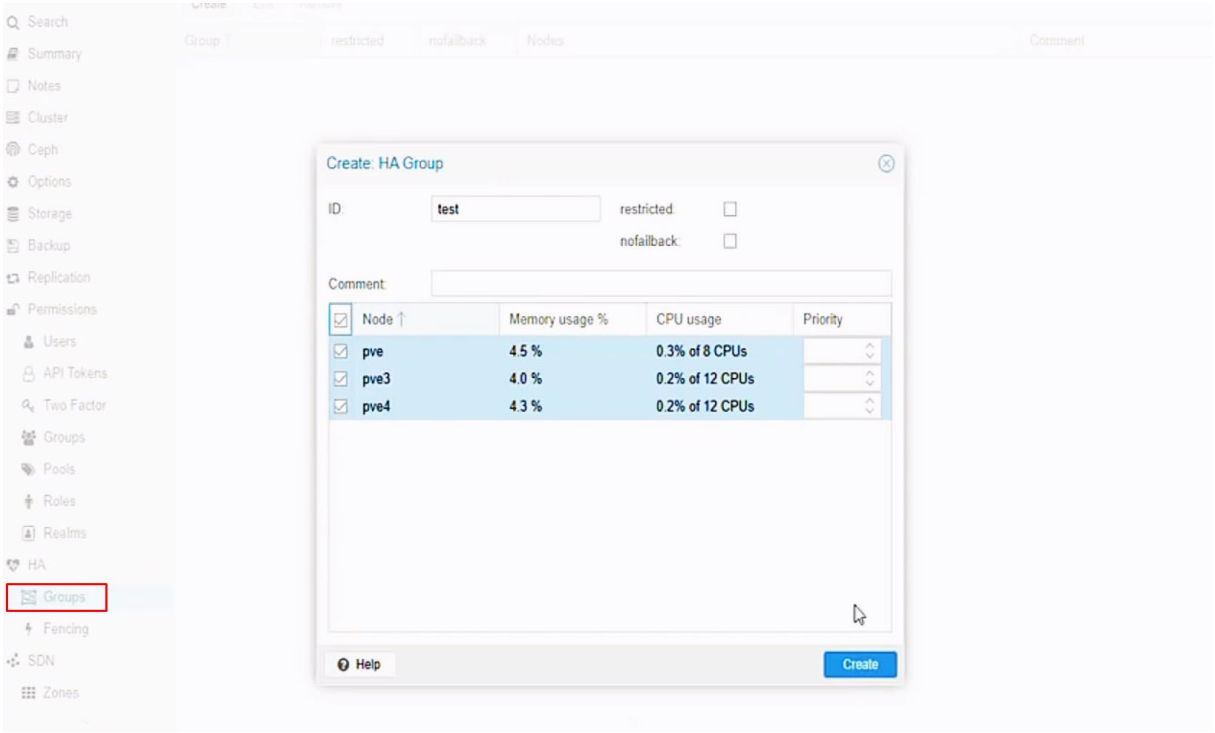


Figure 2-51 Create an HA group

14. Then, go to the **HA** menu, add a VM, and select the group you just created.

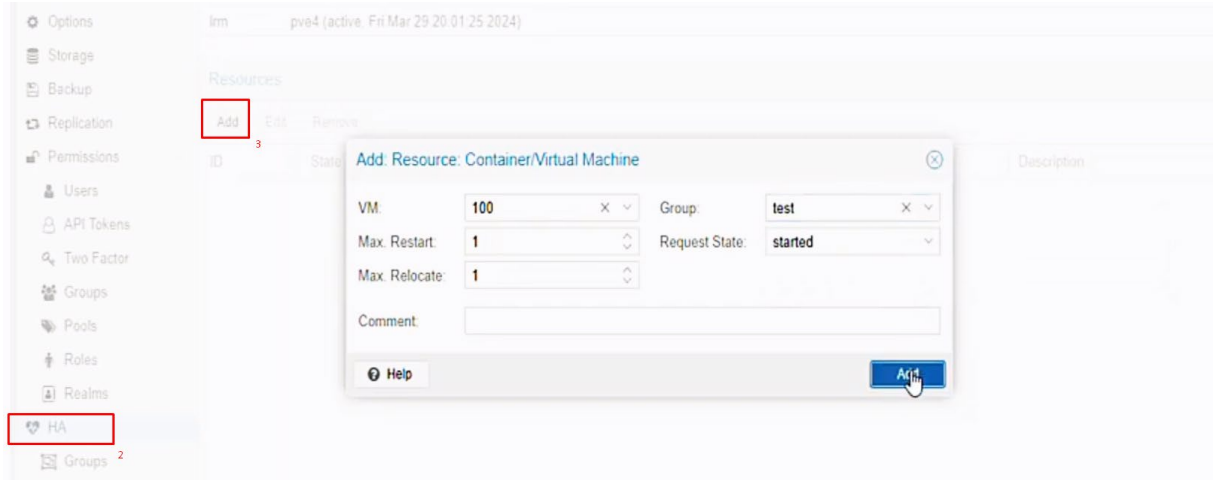


Figure 2-52 Add a VM

15. Finally, you can see that the HA status has changed to **Started**.

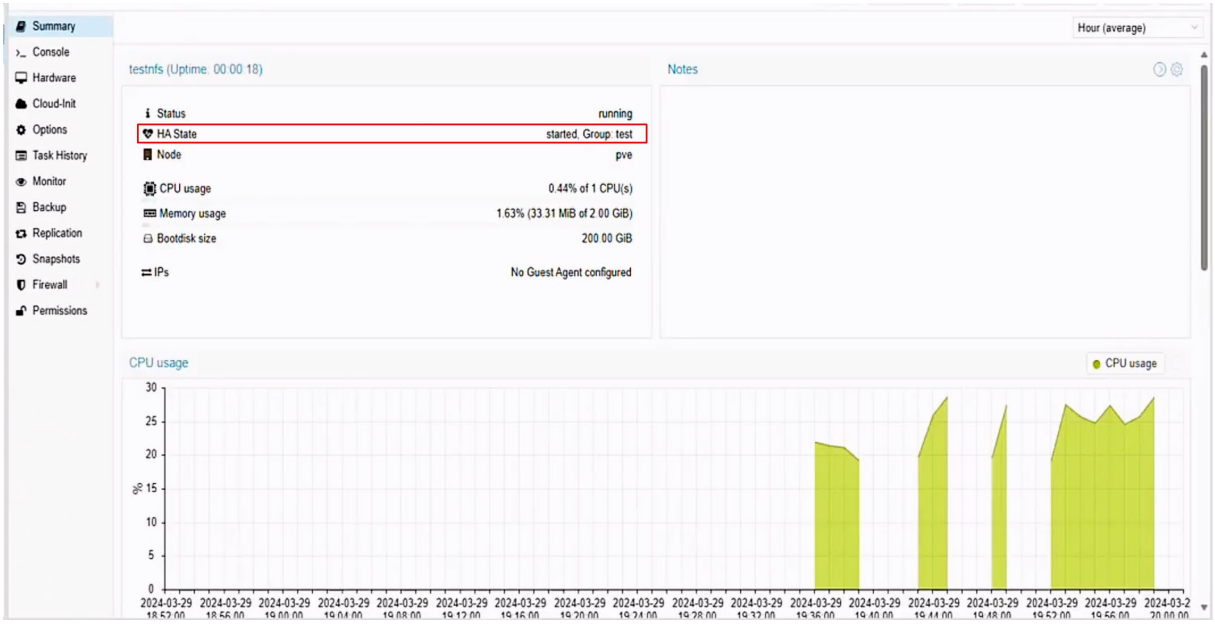


Figure 2-53 HA State Change

2.4.4. Test Result

In this section, we will demonstrate the process of VM migration and failover. This phase is critical to verify the seamless transition of VM in the environment, ensuring they remain functional under a variety of conditions.

1. Before testing, you need to unmount the ISO mounted on the VM in the **Hardware** menu.

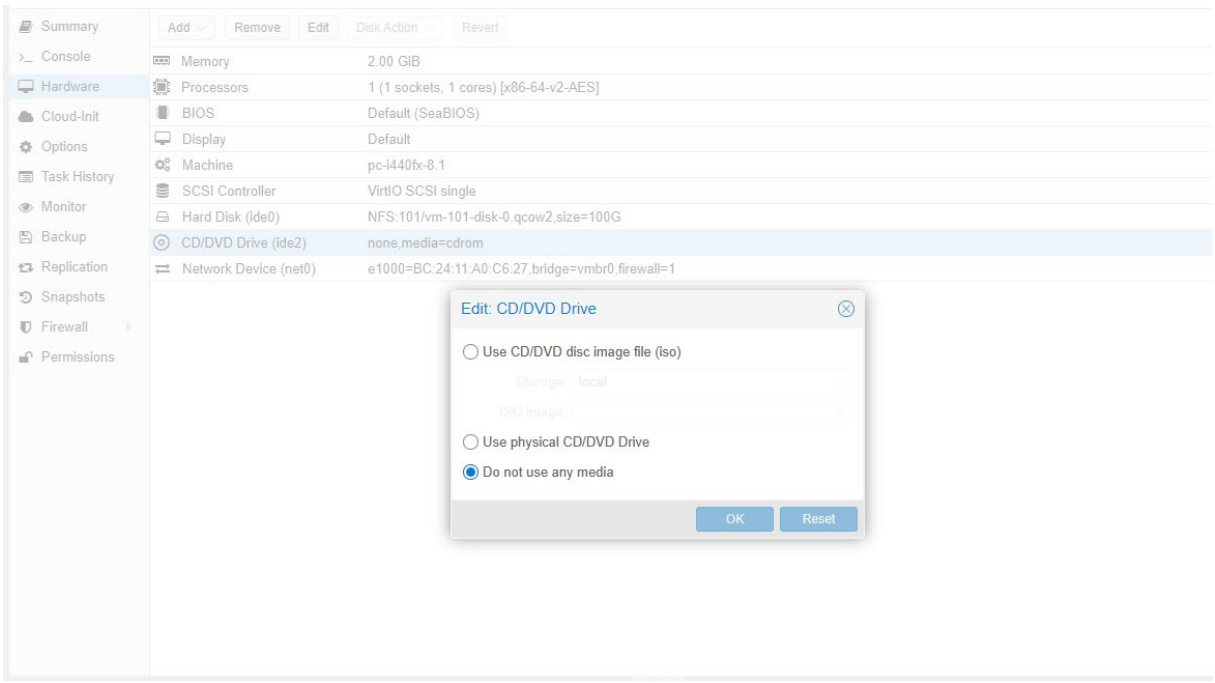


Figure 2-54 Unmount ISO

2. Go to the VM console, click the **Migrate** button, and select the node to move to.

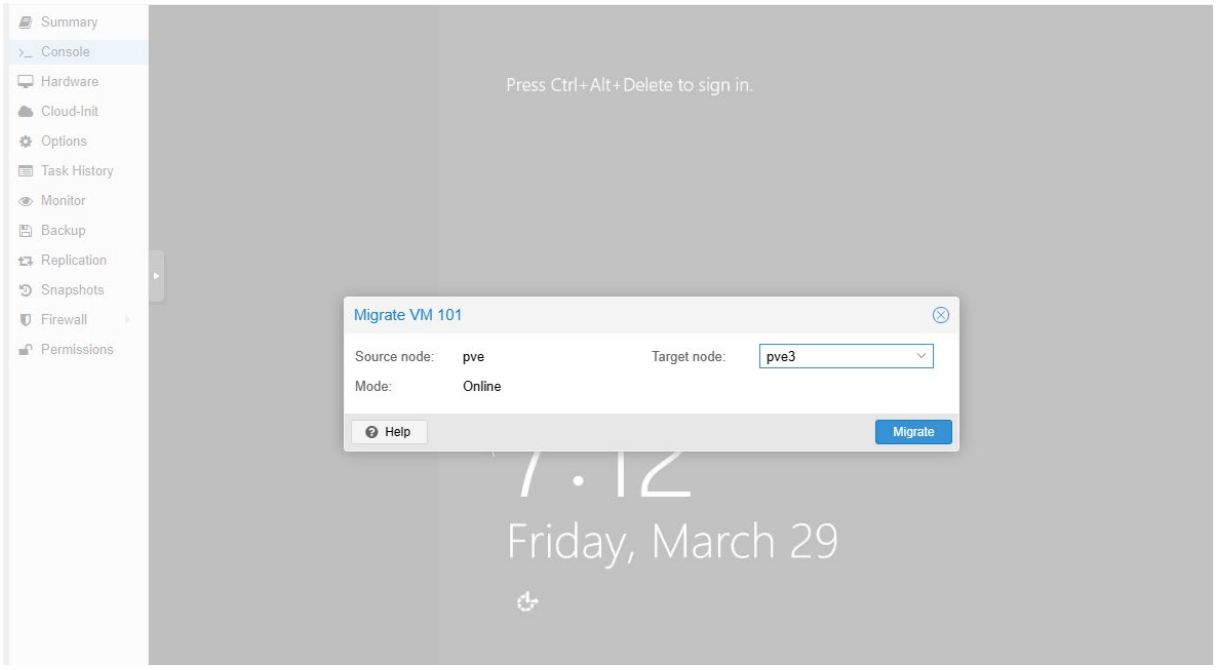


Figure 2-55 VM Migration Step 1

3. After the migration is complete, verify that the ownership of the VM has been transferred to the designated node.

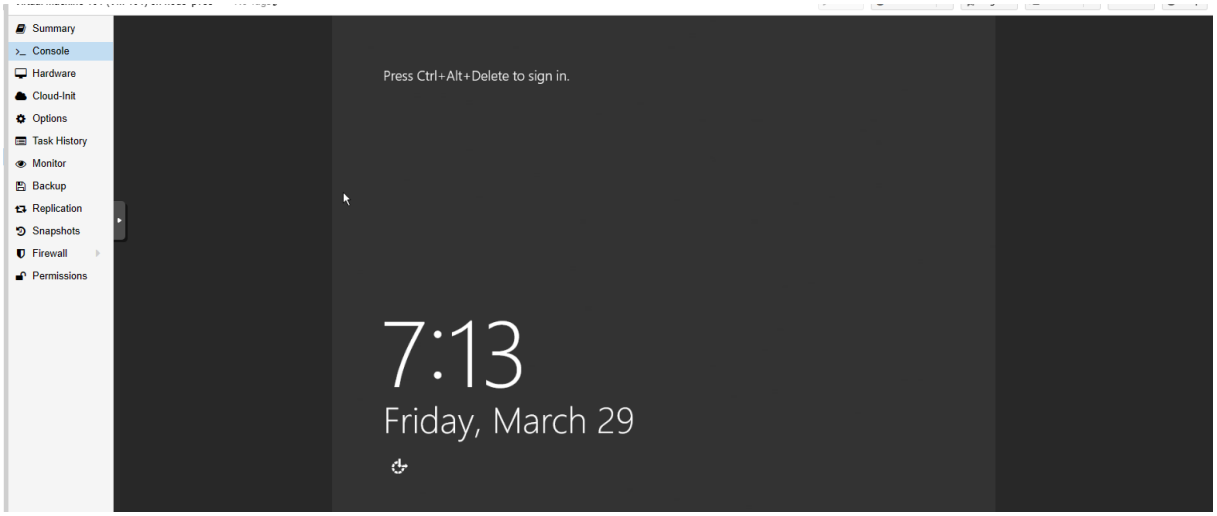


Figure 2-56 VM Migration Step 2

4. You can try to simulate a disaster scenario by shutting down the node that holds the VM.

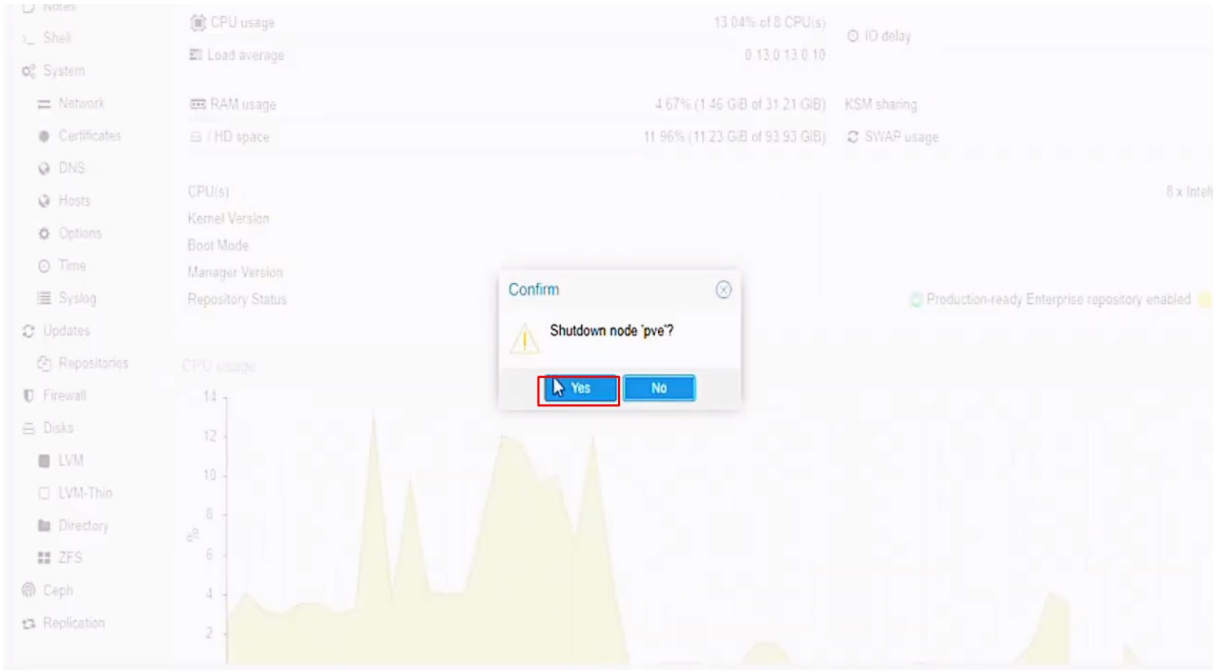


Figure 2-57 Shut Down Node

5. You may notice that the VM does not fail over automatically when the owner node goes down. At this time, you can adjust the priorities in the HA group, setting the priority of the failed node to the lowest and the node to be transferred to the highest. The VM then fails over to the node assigned the highest priority.

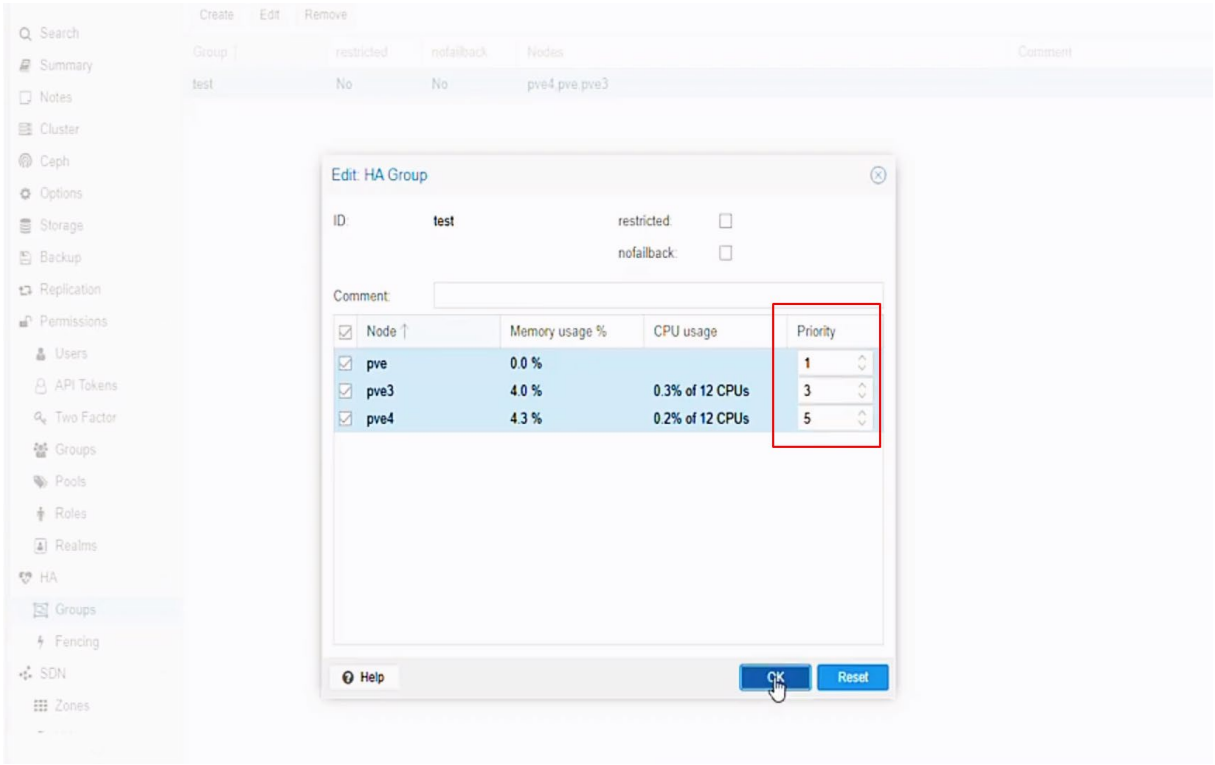


Figure 2-58 Set Priority

6. Verify that the VM has successfully failed over to the highest priority node and is functioning properly.

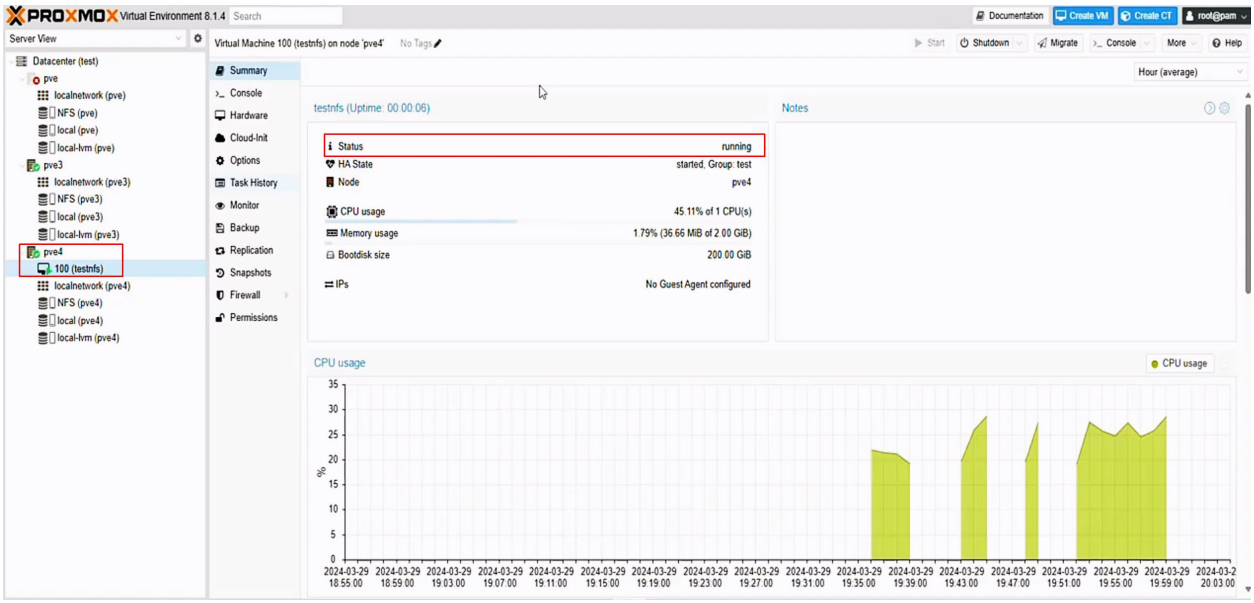


Figure 2-59 VM Failover

3. CONCLUSION

QSAN storage is an ideal solution for virtualization. Deploying iSCSI / SMB / NFS virtualization infrastructure using QSAN storage does not require complex configuration. Enjoy stability and performance, and access QSAN's solutions to optimize your organization's existing IT resources.

Additionally, this document effectively demonstrates the process of setting up a Proxmox high availability cluster using NFS shares, including configuration and implementation of VM migration and failover testing. Comprehensive tutorials on setting up a robust and resilient virtualized environment in QSM are also provided to ensure service continuity and data redundancy. We also explored various storage solutions and their capabilities to support VMs under different operating conditions.

Storage Options to Enhance VM Performance

The table below summarizes our findings and provides a clear overview of the maximum number of VMs that each storage type can support, regardless of latency. This comprehensive analysis is designed to assist in selecting the most appropriate storage solution based on specific performance needs and workload requirements, ensuring optimal deployment and scalability of virtual environments.

Table 3-1 Storage Options to Enhance VM Performance

STORAGE TYPE	LATENCY THRESHOLD	ADDITIONAL VMS SUPPORTED UNDER LATENCY	NUMBER OF VMS SUPPORTED
NVMe Storage	< 100 µs	50+ VMs	Up to 1,000 VMs (high-end configurations)
SAS SSD Storage	< 500 µs	20 ~ 30 VMs	Up to 300 VMs
Hybrid Drive Storage	< 1 ms	10 ~ 20 VMs	Up to 150 VMs
SAS HDD Storage	< 50 ms	3 ~ 4 VMs	Up to 15 VMs

4. APPENDIX

4.1. Apply To

- XEVO firmware 2.3.3 and later
- QSN firmware 4.0.1 and later

4.2. Reference

Document

- XEVO Software Manual
- QSM 4 Software Manual