

THỰC HÀNH QUẢN TRỊ CƠ SỞ DỮ LIỆU

Cài đặt và cấu hình Failover Cluster SQL Server 2019



Nhóm: To be or Not to be

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I. GIỚI THIỆU

- SQL Server đóng vai trò quan trọng, được dùng để lưu trữ dữ liệu cho các ứng dụng. Việc xây dựng một hệ thống SQL có tính chịu lỗi (Failover) và khả năng sẵn sàng cao (High Availability) là hết sức cần thiết. Bài viết này trình bày thao tác cài đặt và cấu hình Failover Cluster cho SQL Server 2012 trên Windows Server 2019 sử dụng dịch vụ lưu trữ iSCSI SAN Storage có sẵn trên Windows.

II. CÁC KHÁI NIỆM CƠ BẢN

a. SAN là gì ?

Mạng vùng lưu trữ (SAN) là một mạng tốc độ cao, chuyên biệt cung cấp quyền truy cập **block-level network** (mạng cấp khôi) để lưu trữ. SAN thường bao gồm máy chủ, bộ chuyển mạch, phần tử lưu trữ và thiết bị lưu trữ được kết nối với nhau bằng nhiều công nghệ, cấu trúc liên kết và giao thức. SAN cũng có thể trải dài trên nhiều trang web.

Storage area network (SAN) hiện có 2 loại chính dùng 2 kiểu protocol khác nhau , là **Fiber Channel** và **iSCSI**.

b. iSCSI là gì?

iSCSI (Internet Small Computer Systems Interface) là bộ lưu trữ từ xa, xuất hiện cho hệ thống máy chủ như một ổ đĩa cục bộ. Giao thức iSCSI liên kết các máy chủ và lưu trữ qua các mạng IP: LAN, WAN và Internet.

c. Failover cluster là gì?

- Windows failover clustering là công nghệ của Microsoft cung cấp tính sẵn sàng cao (High Availability) tại cấp độ máy chủ. Windows failover clustering sử dụng nhiều server tạo thành một nhóm hoặc cụm gọi là cluster.
- Mỗi server trong cluster được gọi là một node, và các node làm việc cùng nhau để tạo thành cluster. Tất cả các node trong một failover cluster liên tục giao tiếp với nhau. Nếu một trong các server trong cluster gặp sự cố, khi đó một trong các server khác trong cluster sẽ đảm nhận khôi phục công việc của server bị lỗi đó. Quá trình này được gọi là failover.
- Node bị hỏng đó sẽ được khôi phục lại. Quá trình này được gọi là fallback

III. CHI TIẾT CÀI ĐẶT

Hướng dẫn này sử dụng 3 server:

- SERVER (IP Address 192.168.1.102) : Domain Controller (THEEND.COM) chạy Windows Server 2019 .
 - SQL1 (IP Address 192.168.1.101): Domain member chạy Windows Server 2016 đóng vai trò SQL Server (Node 1).
 - SQL2 (IP Address 192.168.1.103): Domain member chạy Windows Server 2016 đóng vai trò SQL Server (Node 2).

Các bước dựng:

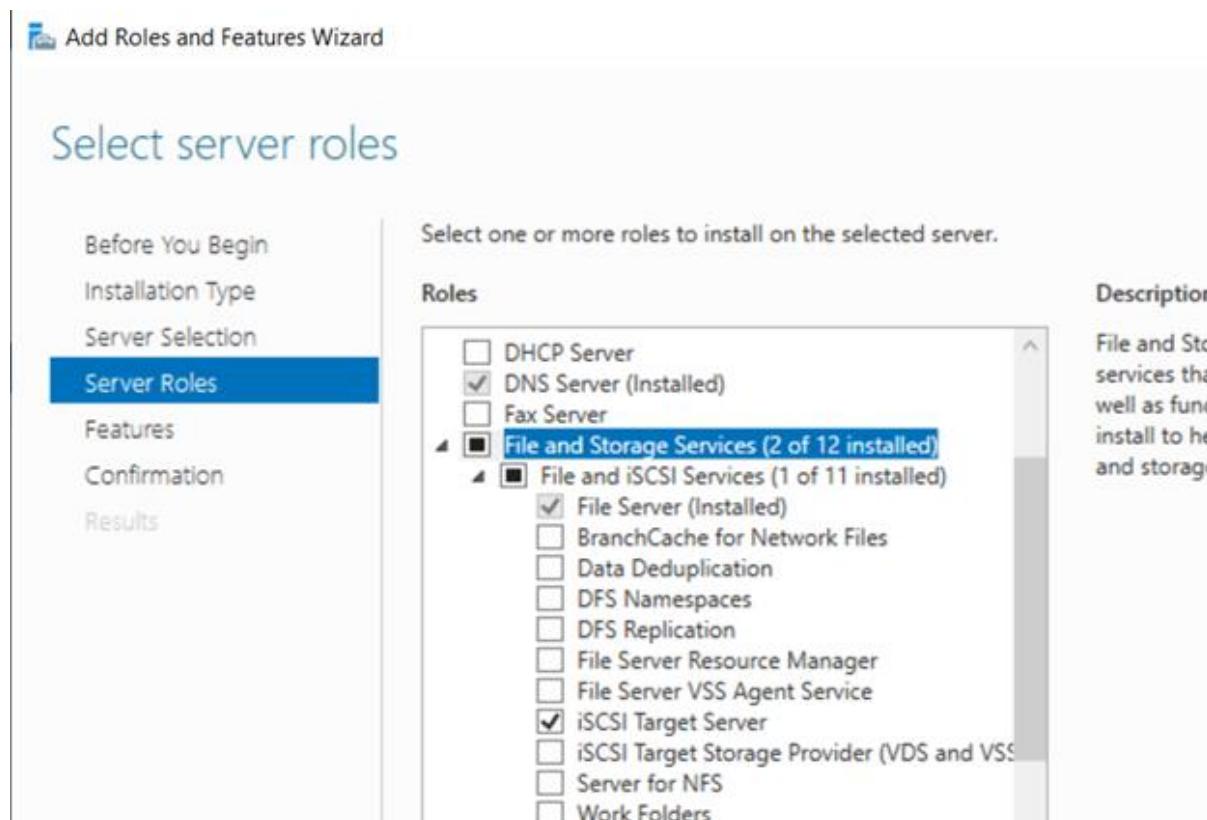
- Chuẩn bị hệ thống lưu trữ.
- Kết nối hệ thống lưu trữ.
- Tạo Failover Cluster.
- Cài đặt SQL Node 1.
- Kết nối SQL Node 2 vào Failover Cluster.
- Kiểm tra hoạt động và khả năng chịu lỗi.

1. Chuẩn bị hệ thống lưu trữ trên máy SERVER, bạn cần cài đặt iSCSI Target Server, sau đó tạo sẵn các iSCSI Virtual Disk và đưa vào 1 iSCSI Target và cho phép 2 máy có IP address là 192.168.1.101 và 192.168.1.103 kết nối. Thực hiện các bước sau:

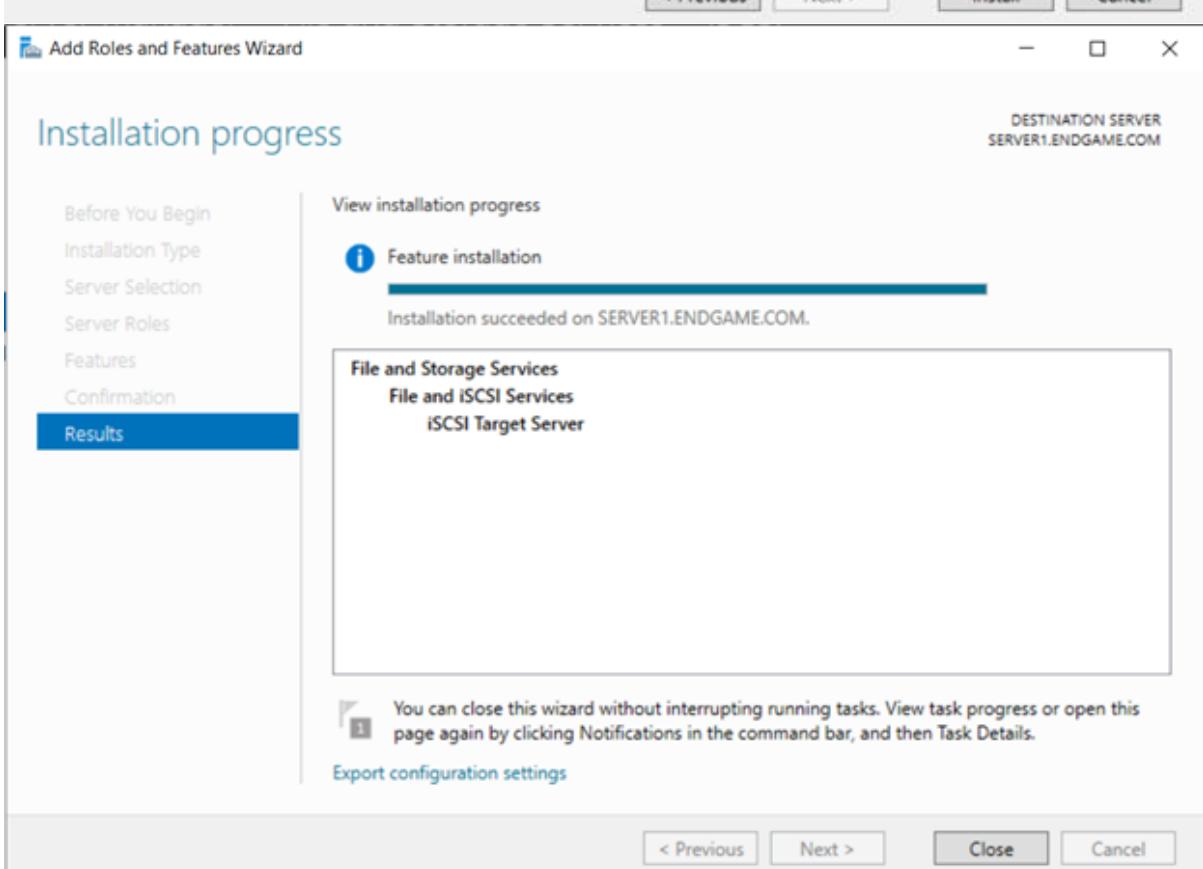
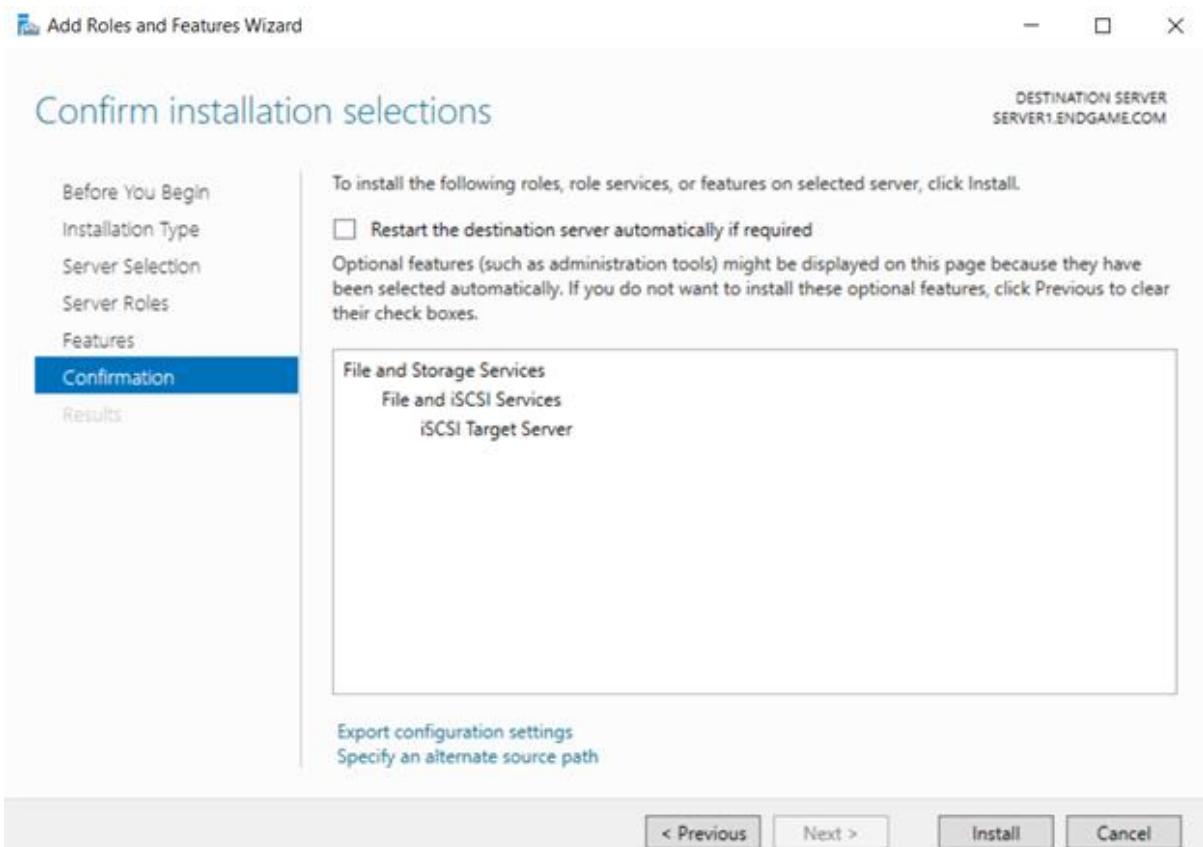
a. Cài đặt iSCSI Target Server

- Trên máy Server, mở Server Manager. Vào menu Manage, chọn Add Roles and Features.

- Màn hình Welcome, nhấn Next. Màn hình Select Server Roles, bung mục File and Storage Services, đánh dấu chọn vào ô iSCSI Target Server.



- Các bước còn lại tiếp tục nhấn Next theo mặc định. Màn hình Confirm installation selections, đánh dấu chọn vào ô Restart the destination server automatically if required, sau đó nhấn Install.

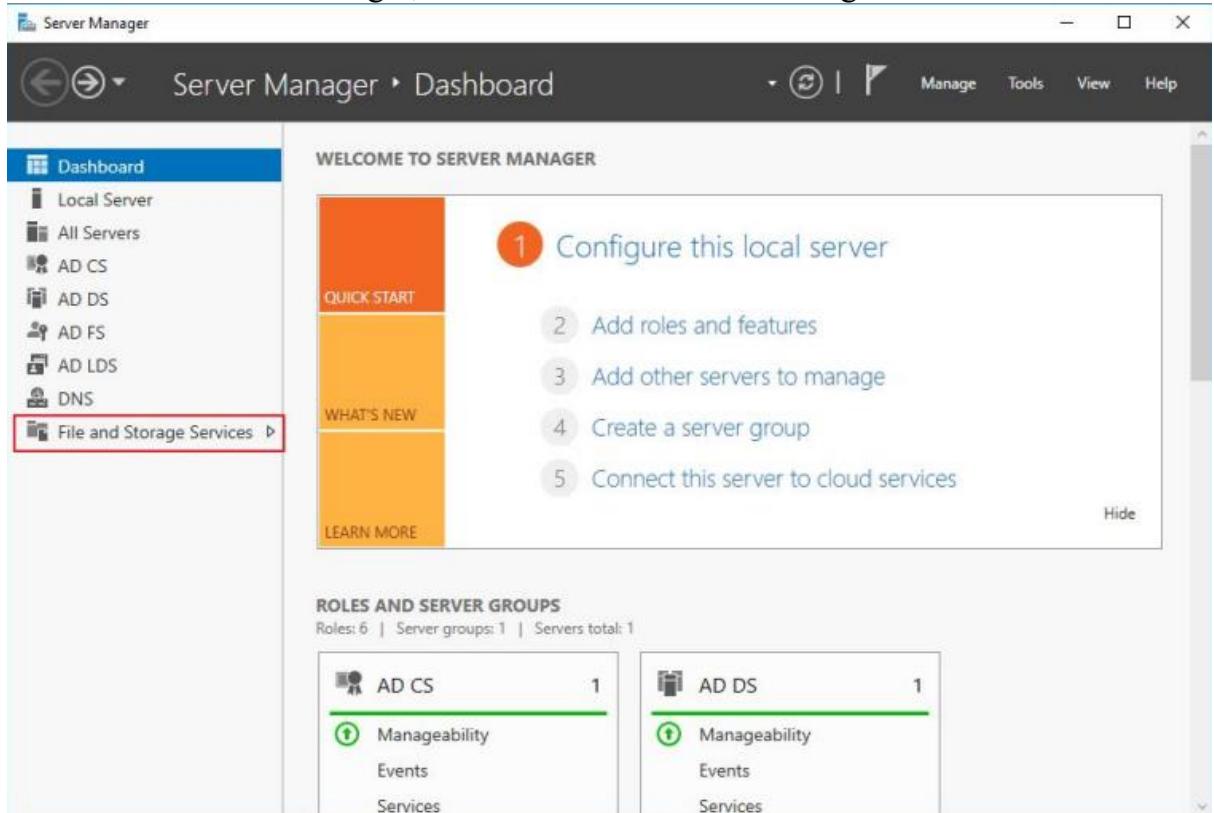


- Sau khi cài đặt xong, chương trình sẽ yêu cầu khởi động lại máy tính

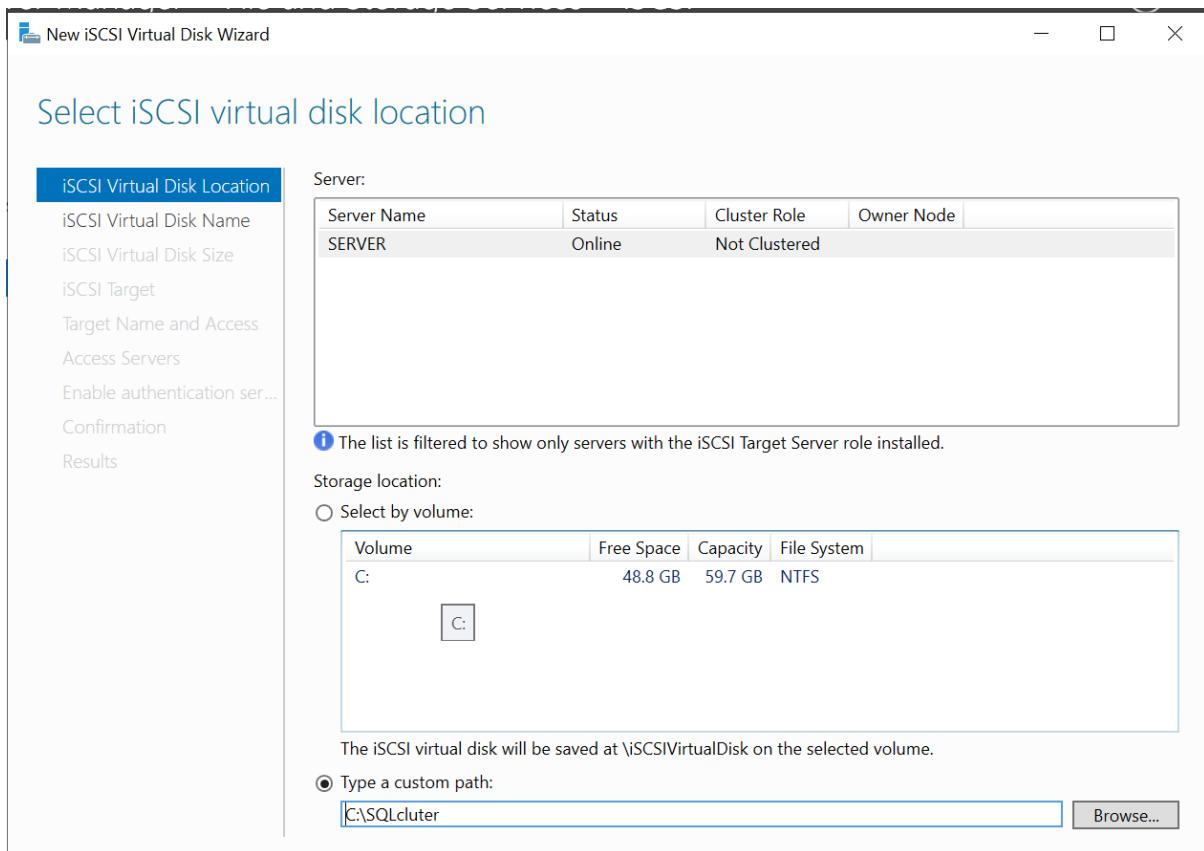
b. Tạo iSCSI Virtual Disk

iSCSI Virtual Disk là các đĩa ảo được tạo ra từ physical disk. Như vậy một physical disk có thể tạo ra nhiều iSCSI Virtual Disk, phải tính toán tùy theo mục đích sử dụng.

- Mở Server Manager, ở bên trái chọn File and Storage Services.

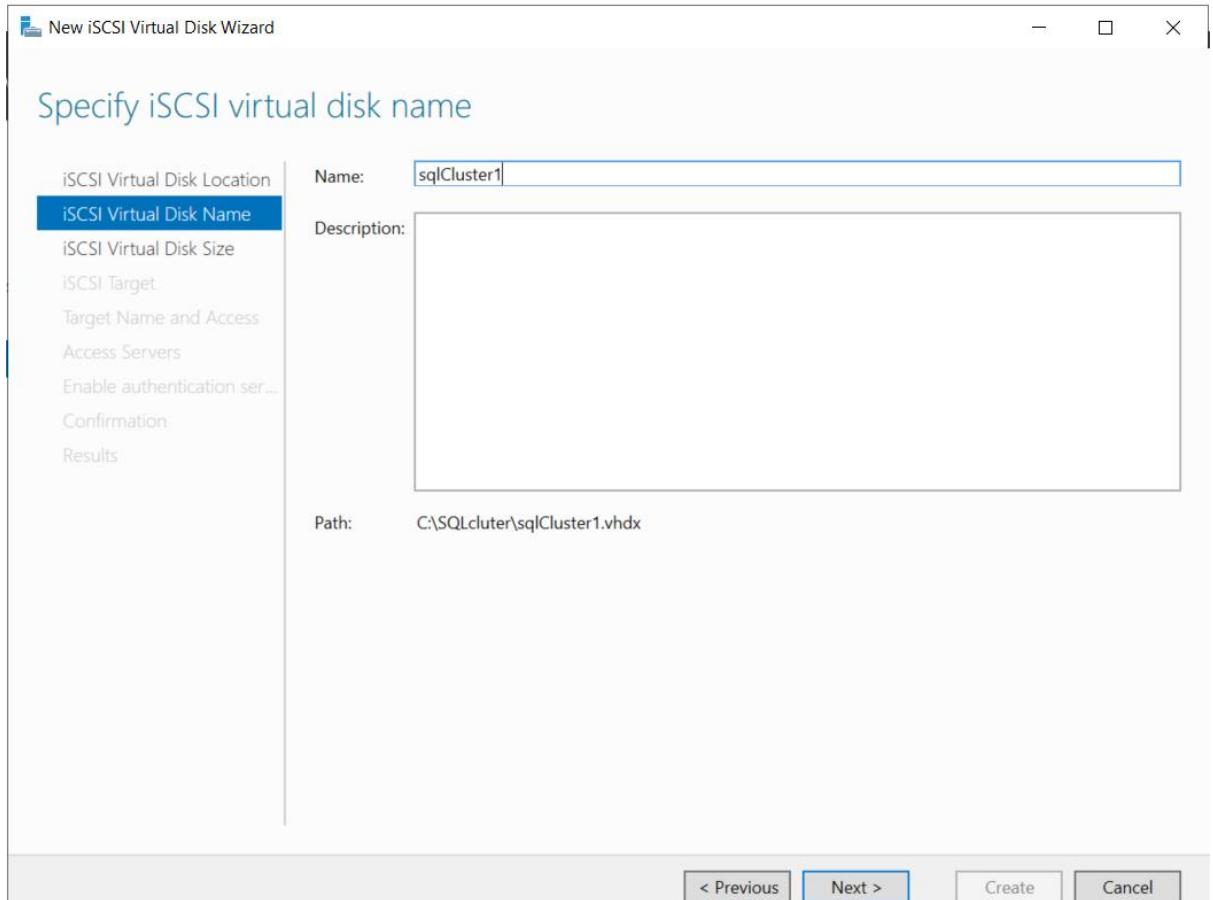


Ở khung bên trái, chọn iSCSI, sau đó vào mục TASKS nằm ở góc phải, chọn New iSCSI Virtual Disk.

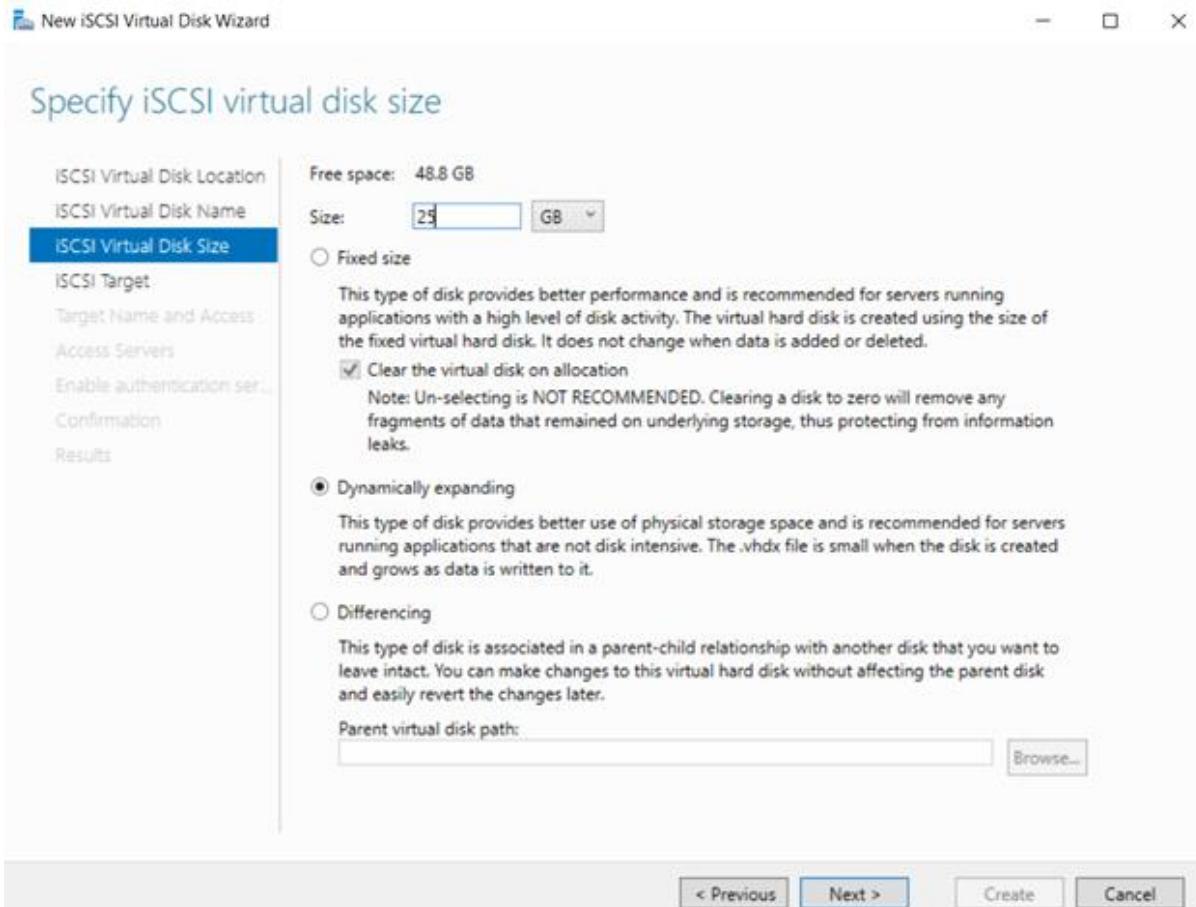


- Màn hình Select iSCSI virtual disk location, ở mục Select by volume chọn vào phân vùng cần tạo iSCSI Virtual Disk (chúng ta sẽ tạo Disk1 từ ổ đĩa C)

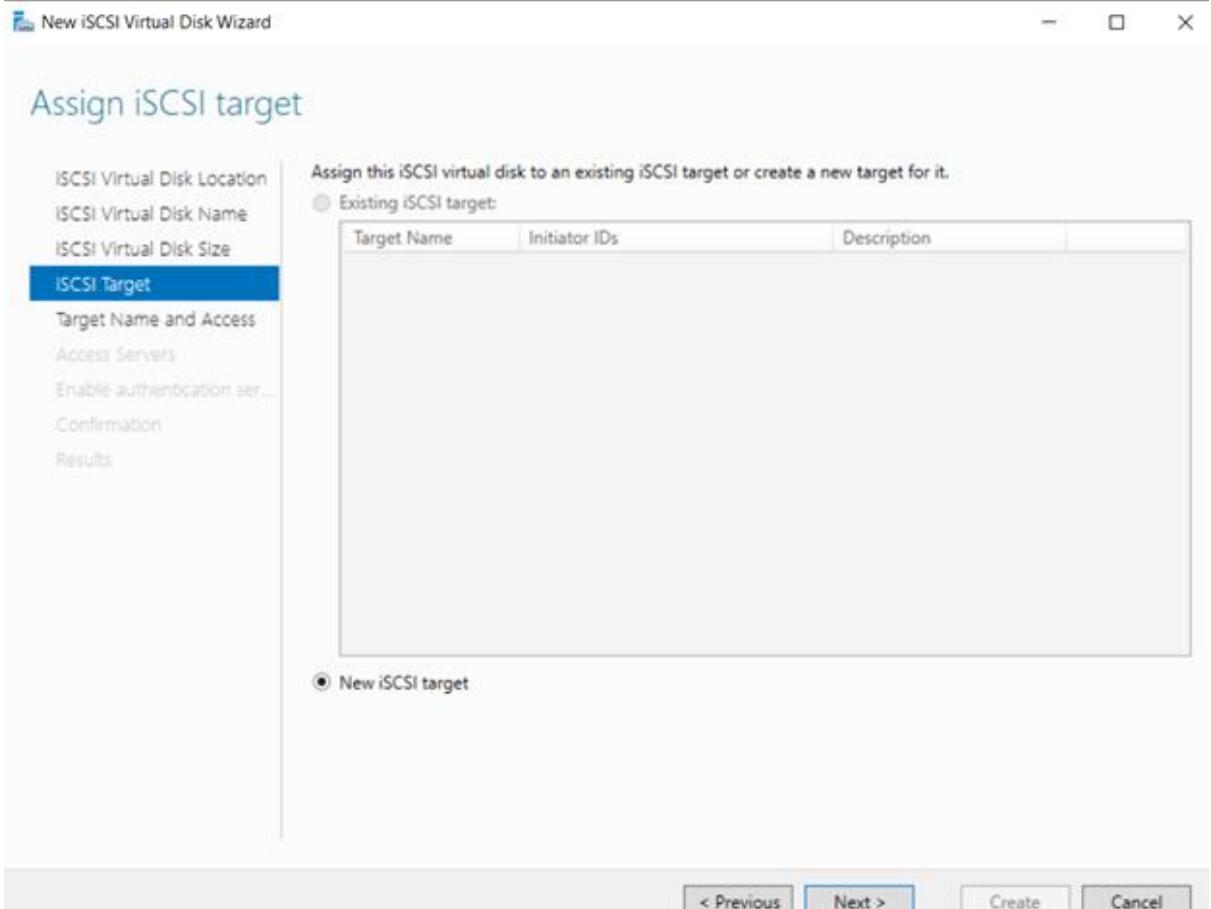
- Màn hình Specify iSCSI virtual disk name, ở mục Name, đặt tên là sqlCluster1. Bạn chú ý ở mục Path, Windows Server 2019 sẽ sử dụng công nghệ đĩa cứng ảo thông qua file vhdx.



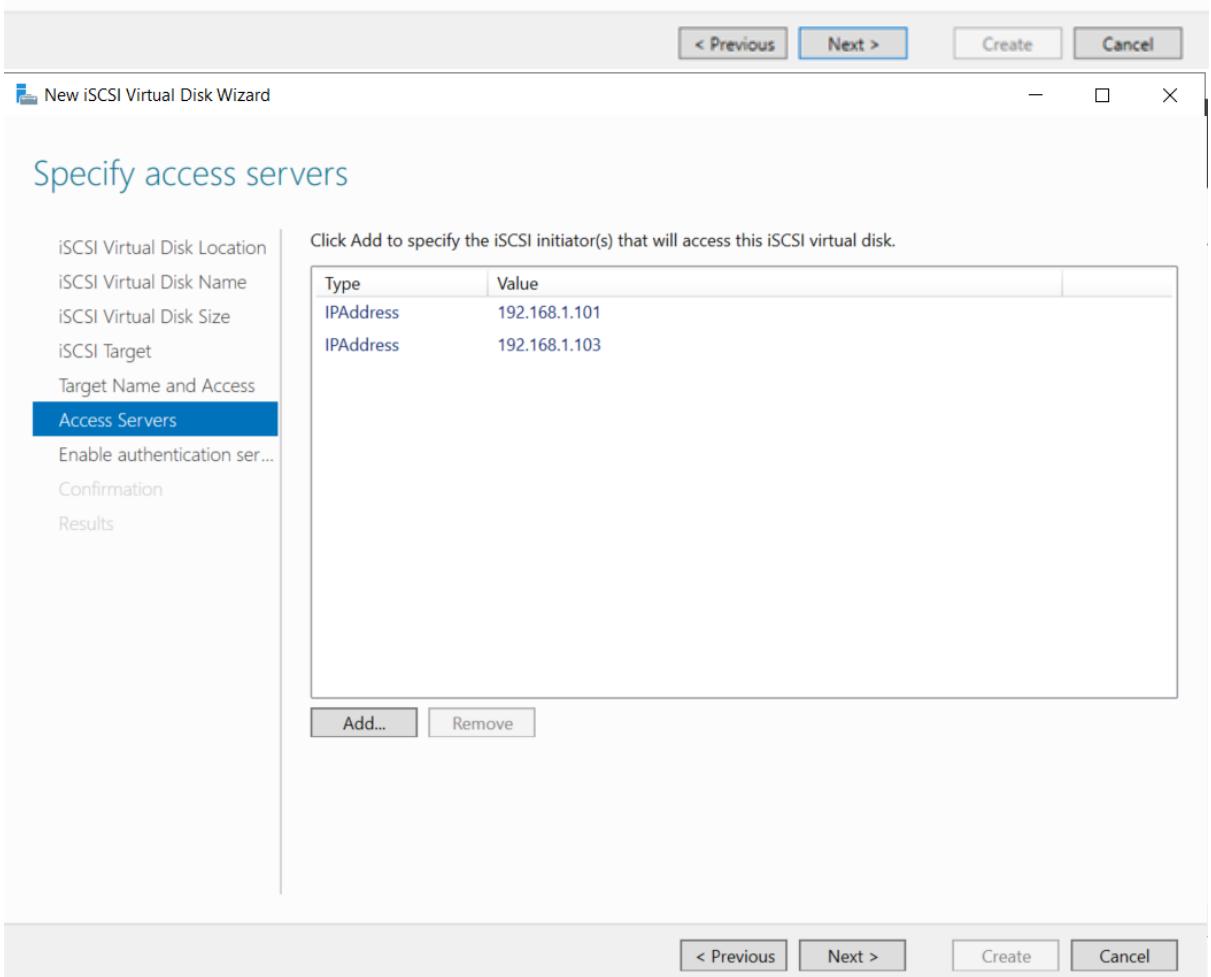
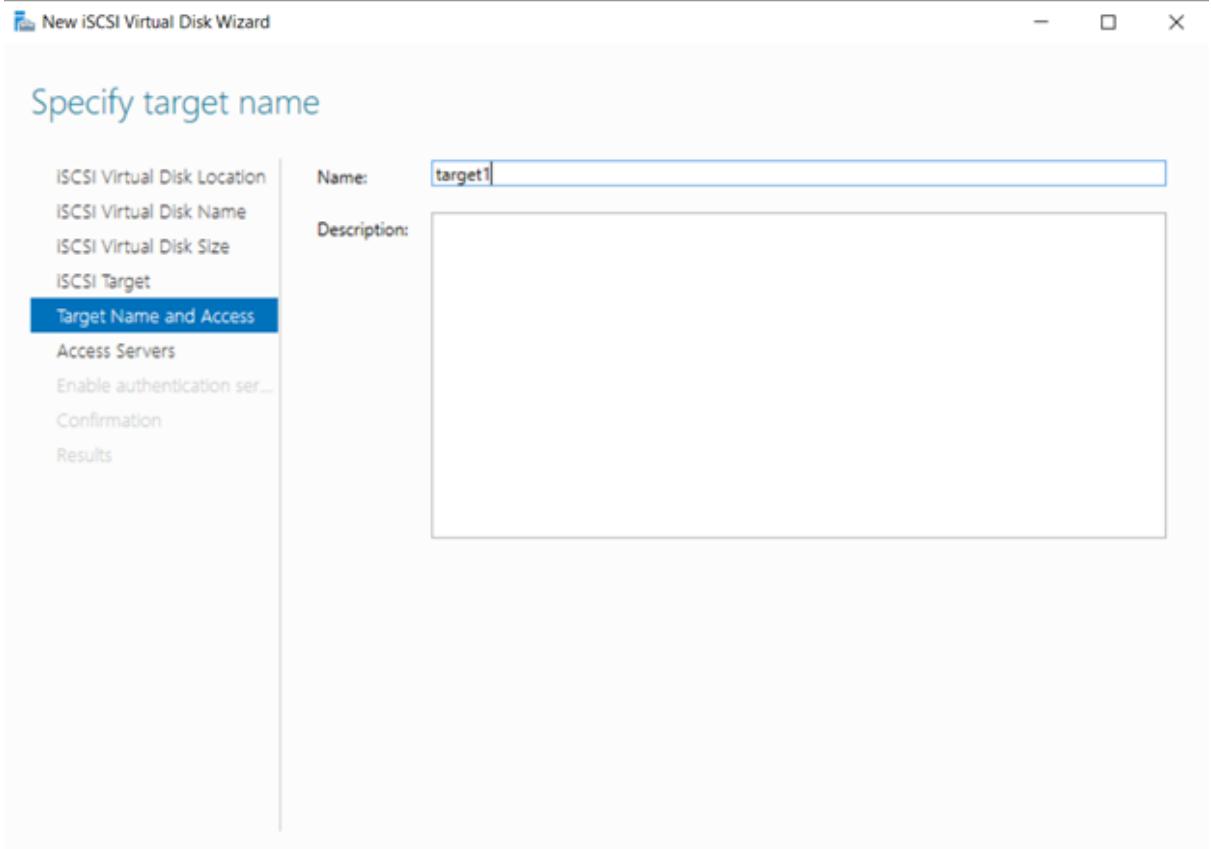
Màn hình Specify iSCSI virtual disk size, ở mục Free space sẽ cho biết dung lượng còn trống ở physical disk. Ở mục Size, bạn thiết lập dung lượng cho iSCSI virtual disk, trong bài này chúng ta sẽ tạo sqlCluster1 có dung lượng 25 GB.



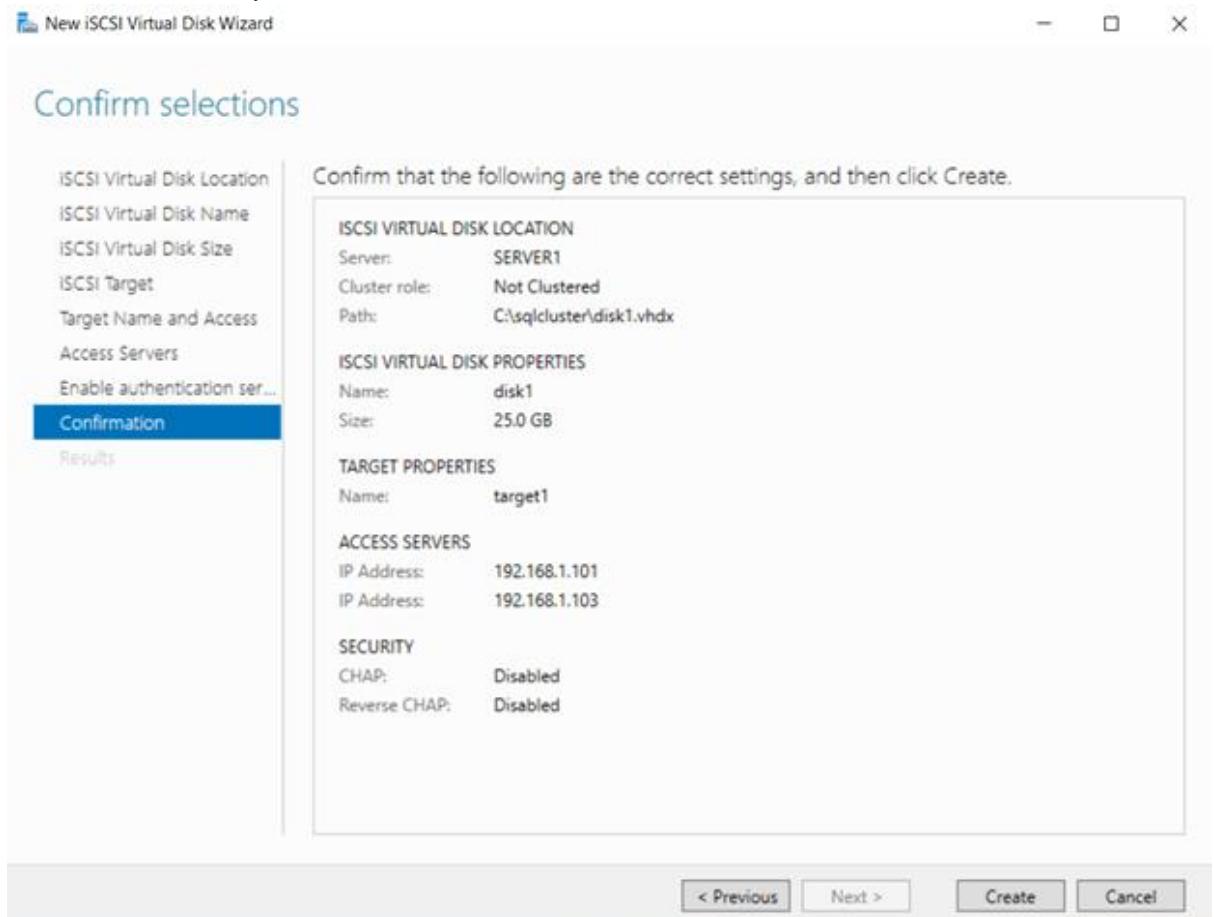
- Màn hình Specify iSCSI target, chọn New iSCSI target. iSCSI Target: tập hợp gồm 1 hoặc nhiều iSCSI Virtual Disk, là thành phần để các Server có thể kết nối và sử dụng



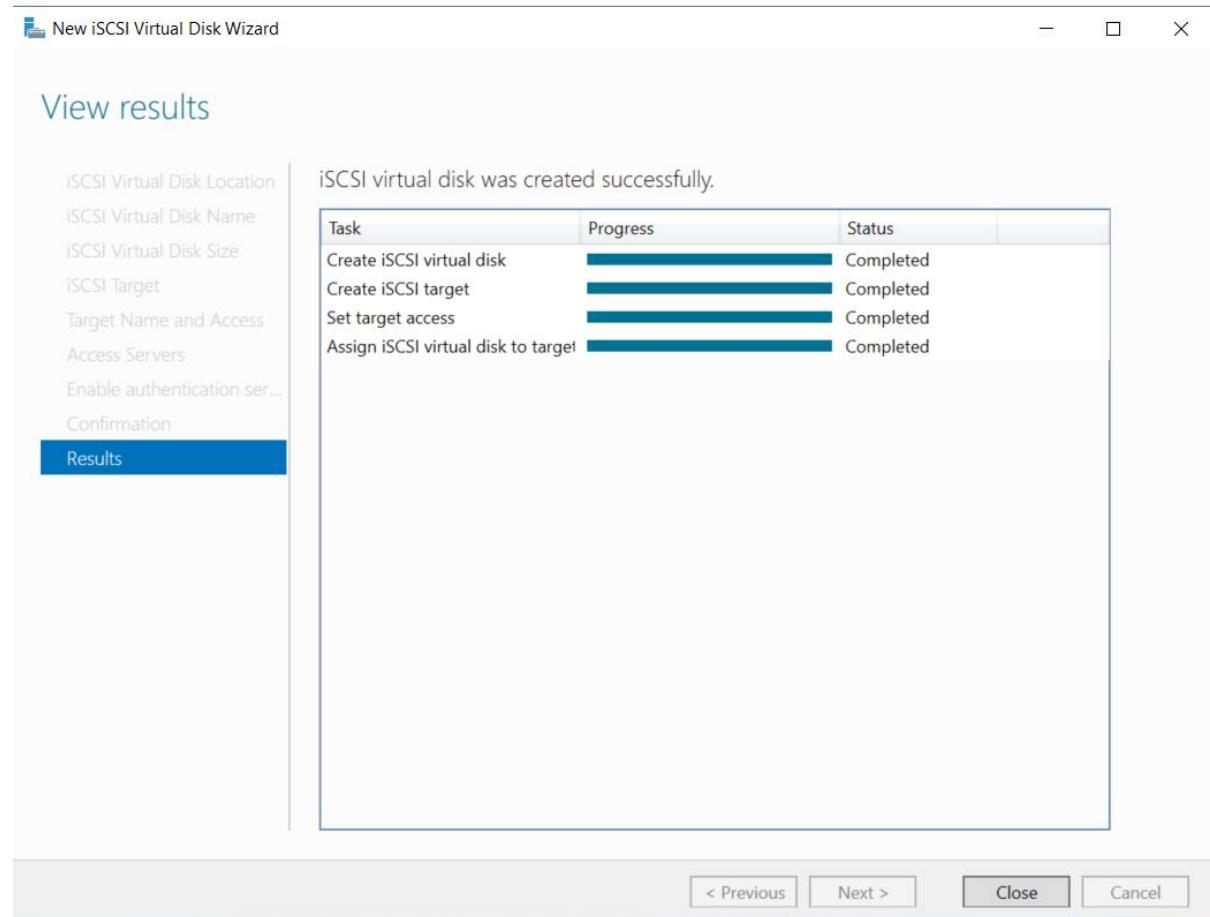
- Màn hình Specify target name, ở mục Name, đặt tên cho target của mình là Target 1.



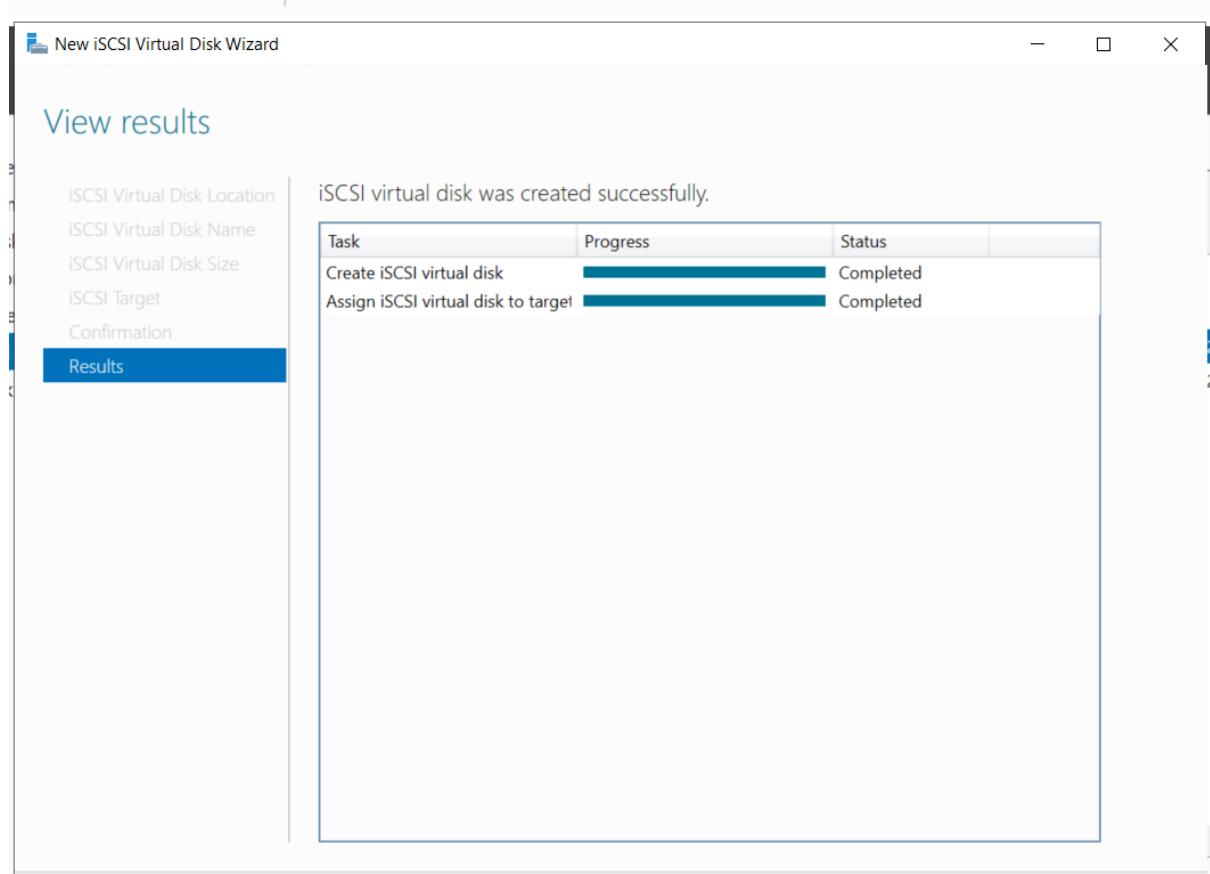
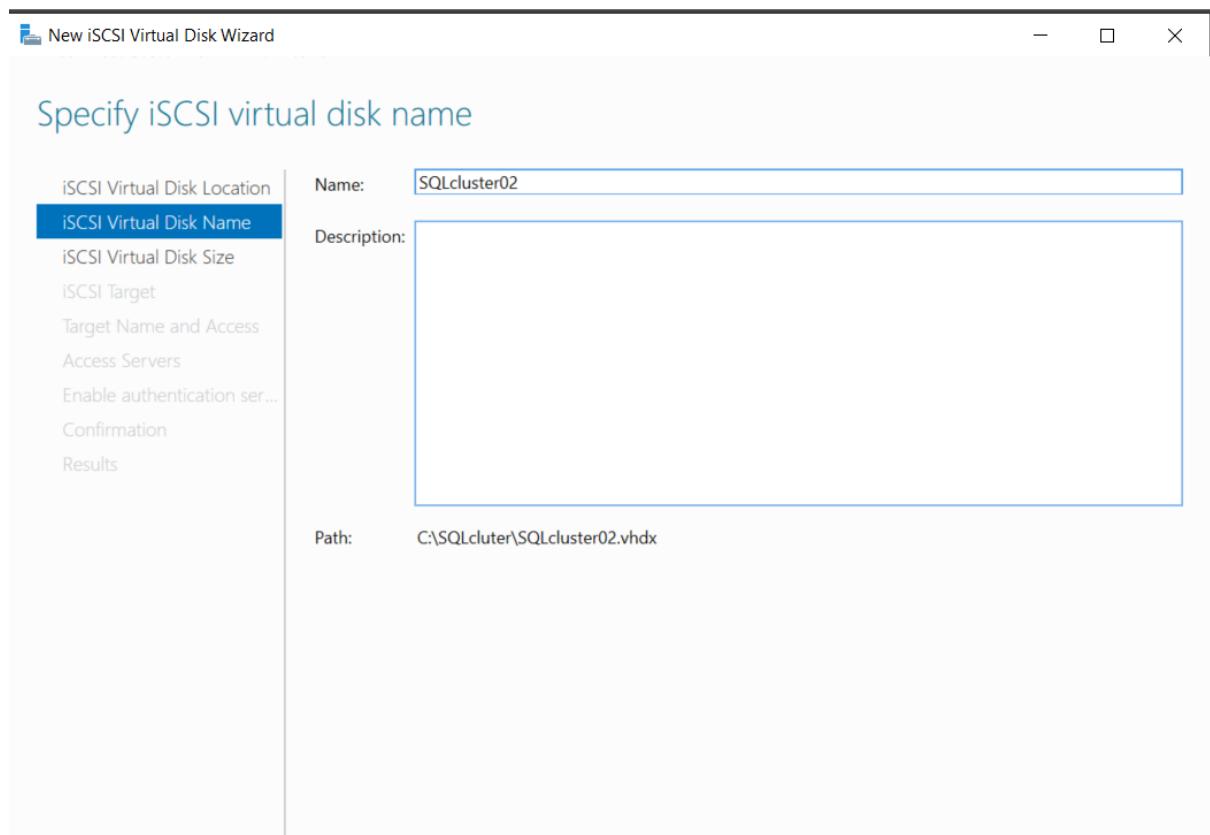
- Màn hình Enable Authentication, bạn nhấn Next theo mặc định
- Màn hình Confirmation, kiểm tra các thông tin màn hình đã thiết lập. Sau đó, nhấn vào nút Create để tạo mới iSCSI Virtual Disk

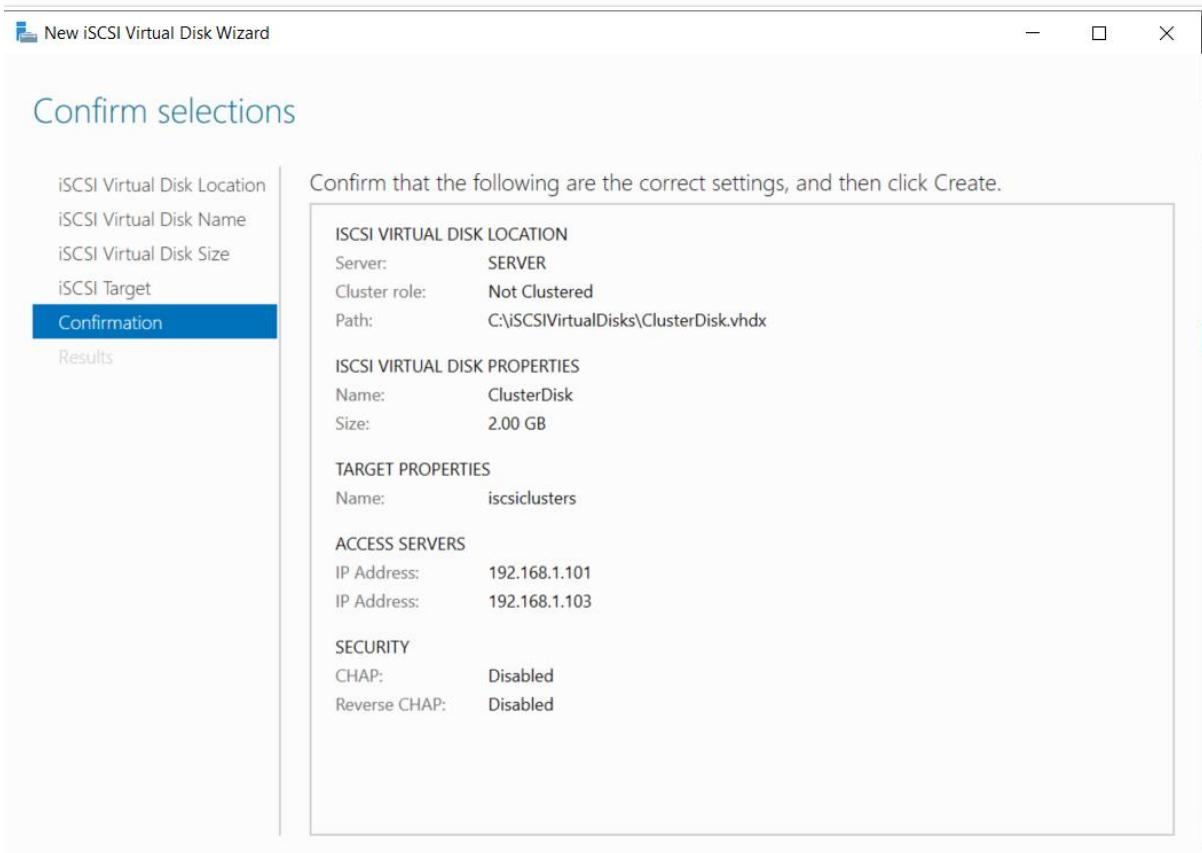
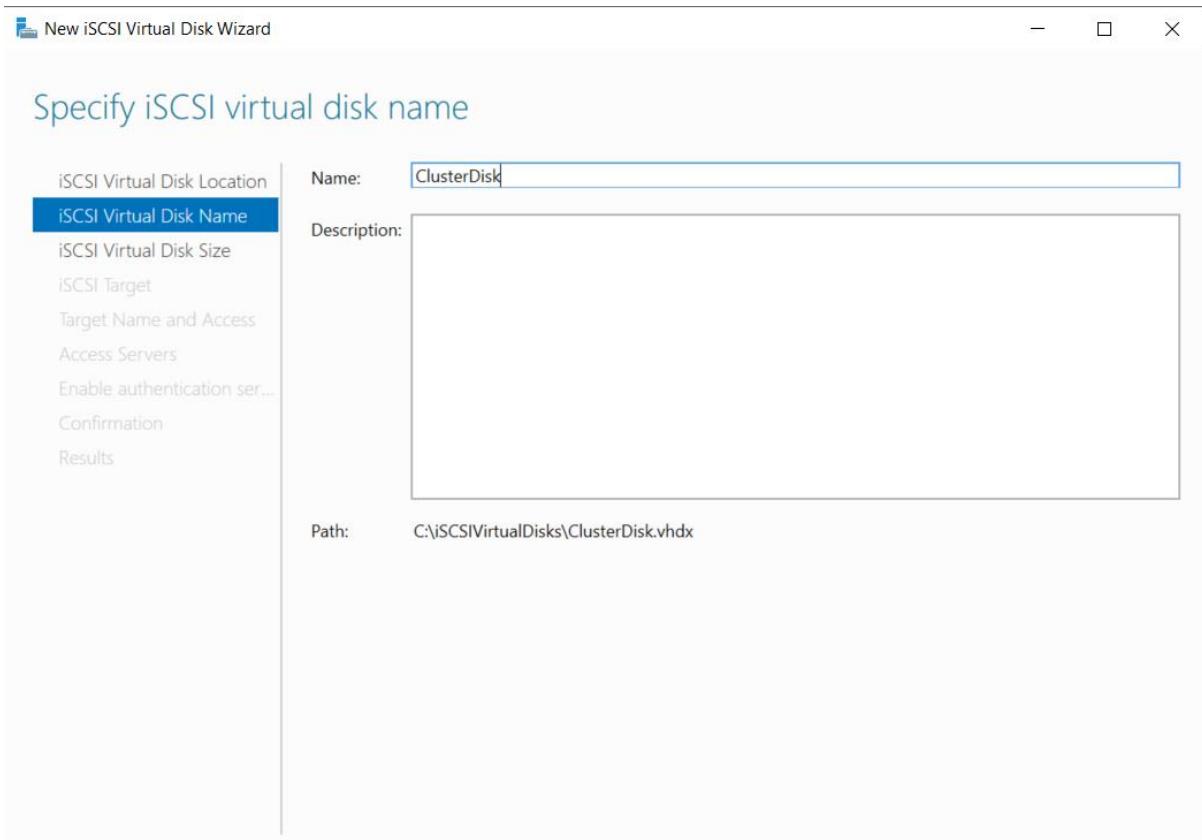


- Màn hình View Results, khi nhận được thông báo iSCSI Virtual Disk was created successfully nghĩa là quá trình tạo đĩa đã thành công



Tương tự chúng ta tạo sqlCluster02





New iSCSI Virtual Disk Wizard

View results

iSCSI Virtual Disk Location
iSCSI Virtual Disk Name
iSCSI Virtual Disk Size
iSCSI Target
Confirmation
Results

iSCSI virtual disk was created successfully.

Task	Progress	Status
Create iSCSI virtual disk	<div style="width: 100%; background-color: #0070C0; height: 10px;"></div>	Completed
Assign iSCSI virtual disk to target	<div style="width: 100%; background-color: #0070C0; height: 10px;"></div>	Completed

ISCSI VIRTUAL DISKS
All iSCSI virtual disks | 3 total

Path	Status	Virtual Disk Status	Target Name	Target Status	Initiator ID	Size
\\ SERVER (3)						
C:\SQLcluster\sqlCluster1.vhdx	Connected	iscsiclusters	Connected		IPAddress:192.168.1.101, IPAddress:192.168.1.103	25.0 GB
C:\SQLcluster\SQLcluster02.vhdx	Connected	iscsiclusters	Connected		IPAddress:192.168.1.101, IPAddress:192.168.1.103	30.0 GB
C:\ISCSIVirtualDisks\ClusterDisk.vhdx	Connected	iscsiclusters	Connected		IPAddress:192.168.1.101, IPAddress:192.168.1.103	2.00 GB

Last refreshed on 3/23/2021 2:10:26 PM

2. TẠO FAILOVER CLUSTER - TRÊN 2 MÁY SQL1 VÀ SQL2, CHÚNG TA CÀI ĐẶT FEATURE FAILOVER CLUSTERING.

A. MÁY SQL 1

Đặt tên máy

Computer Name/Domain Changes

X

You can change the name and the membership of this computer.
Changes might affect access to network resources.

Computer name:

sql1

Full computer name:

sql1

[More...](#)

Member of

Domain:

Workgroup:

WORKGROUP

OK

Cancel

Computer name, domain, and workgroup settings

Computer name: sql01

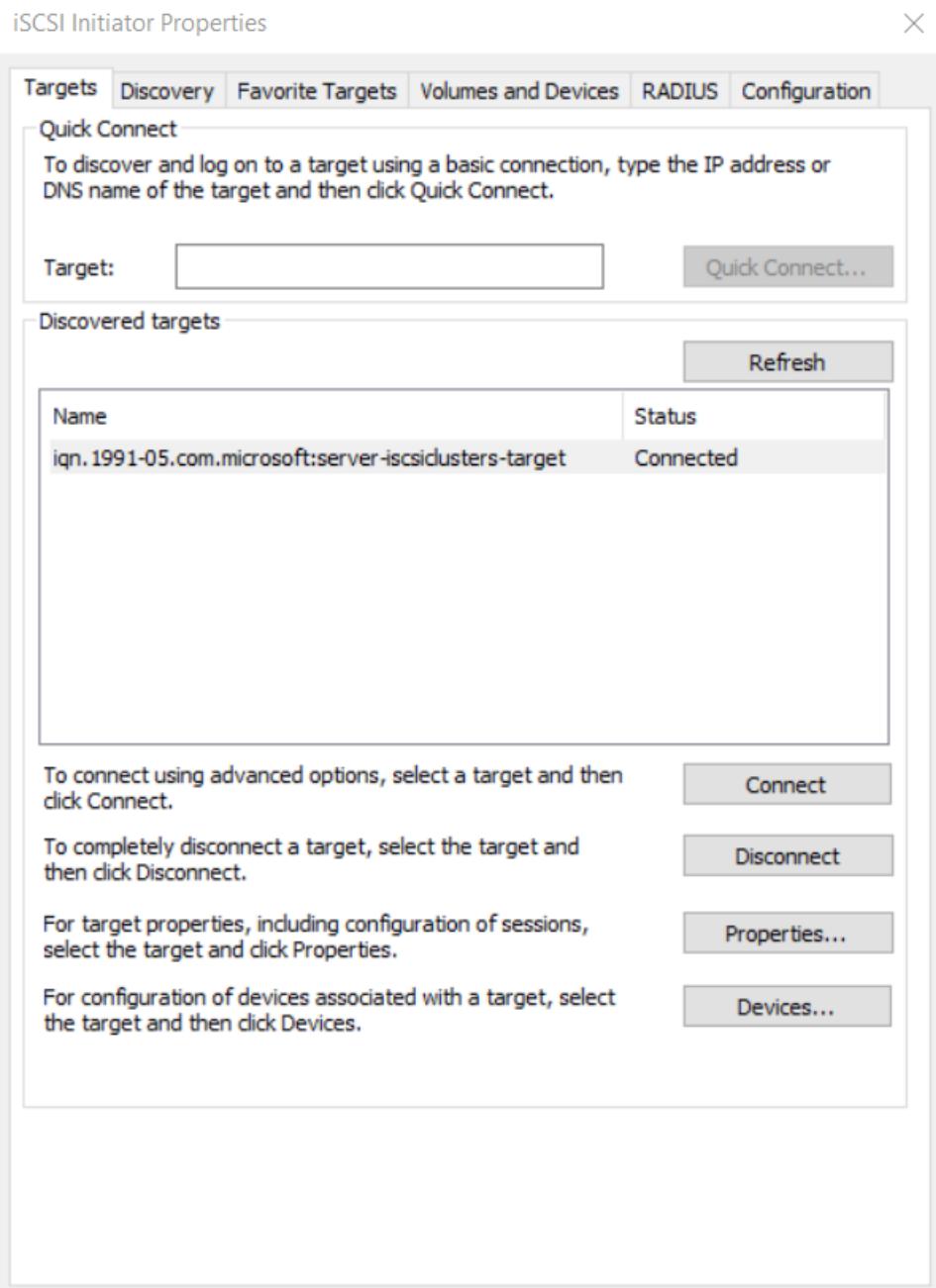
[Change settings](#)

Full computer name: sql01.THEEND.COM

Computer description:

Domain: THEEND.COM

Join cluster



Kiểm tra đĩa đã cài đặt:

		DISKS										
		All disks 4 total										
		Filter <input type="text"/> ⟳ ☷ ⟳										
		Number	Virtual Disk	Status	Capacity	Unallocated	Partition	Read Only	Clustered	Subsystem	Bus Type	Name
		1		Offline	25.0 GB	25.0 GB	Unknown	✓		iSCSI	MSFT Virtual HD	
		2		Offline	30.0 GB	30.0 GB	Unknown	✓		iSCSI	MSFT Virtual HD	
		3		Offline	2.00 GB	2.00 GB	Unknown	✓		iSCSI	MSFT Virtual HD	
		0		Online	60.0 GB	0.00 B	GPT			NVMe	VMware Virtual NVMe...	

Thay đổi trạng thái đĩa

Number	Virtual Disk	Status	Capacity	Unallocated	Partition	Read Only	Clustered	Subsystem	Bus Type	Name
sq01 (4)										
1		Online	25.0 GB	25.0 GB	Unknown			iSCSI	MSFT Virtual HD	
2		Online	30.0 GB	30.0 GB	Unknown			iSCSI	MSFT Virtual HD	
3		Online	2.00 GB	2.00 GB	Unknown			iSCSI	MSFT Virtual HD	
0		Online	60.0 GB	0.00 B	GPT			NVMe	VMware Virtual NVMe...	

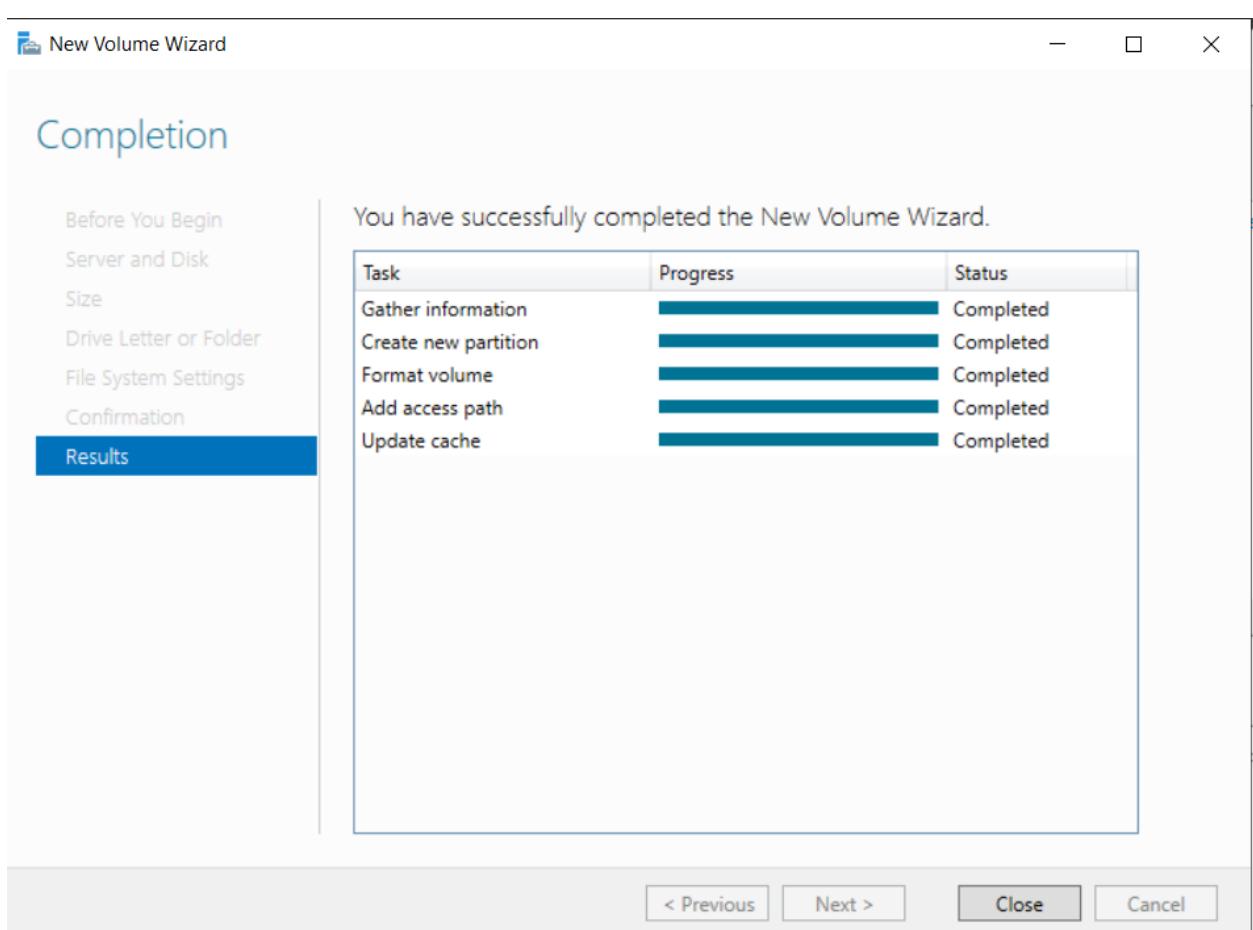
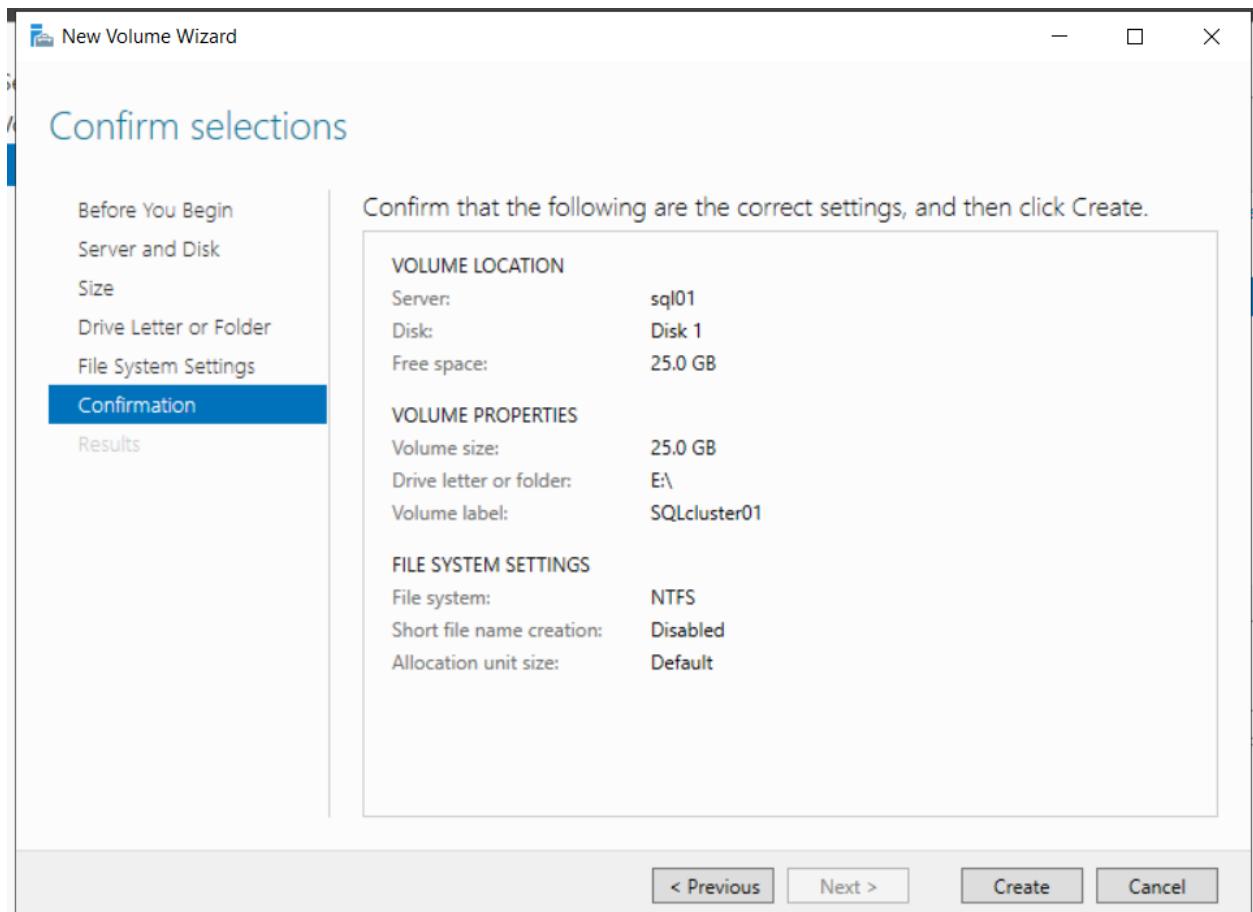
Number	Virtual Disk	Status	Capacity	Unallocated	Partition	Read Only	Clustered	Subsystem	Bus Type	Name
sq01 (4)										
1		Online	25.0 GB	25.0 GB	GPT			iSCSI	MSFT Virtual HD	
2		Online	30.0 GB	30.0 GB	GPT			iSCSI	MSFT Virtual HD	
3		Online	2.00 GB	1.98 GB	GPT			iSCSI	MSFT Virtual HD	
0		Online	60.0 GB	0.00 B	GPT			NVMe	VMware Virtual NVMe...	

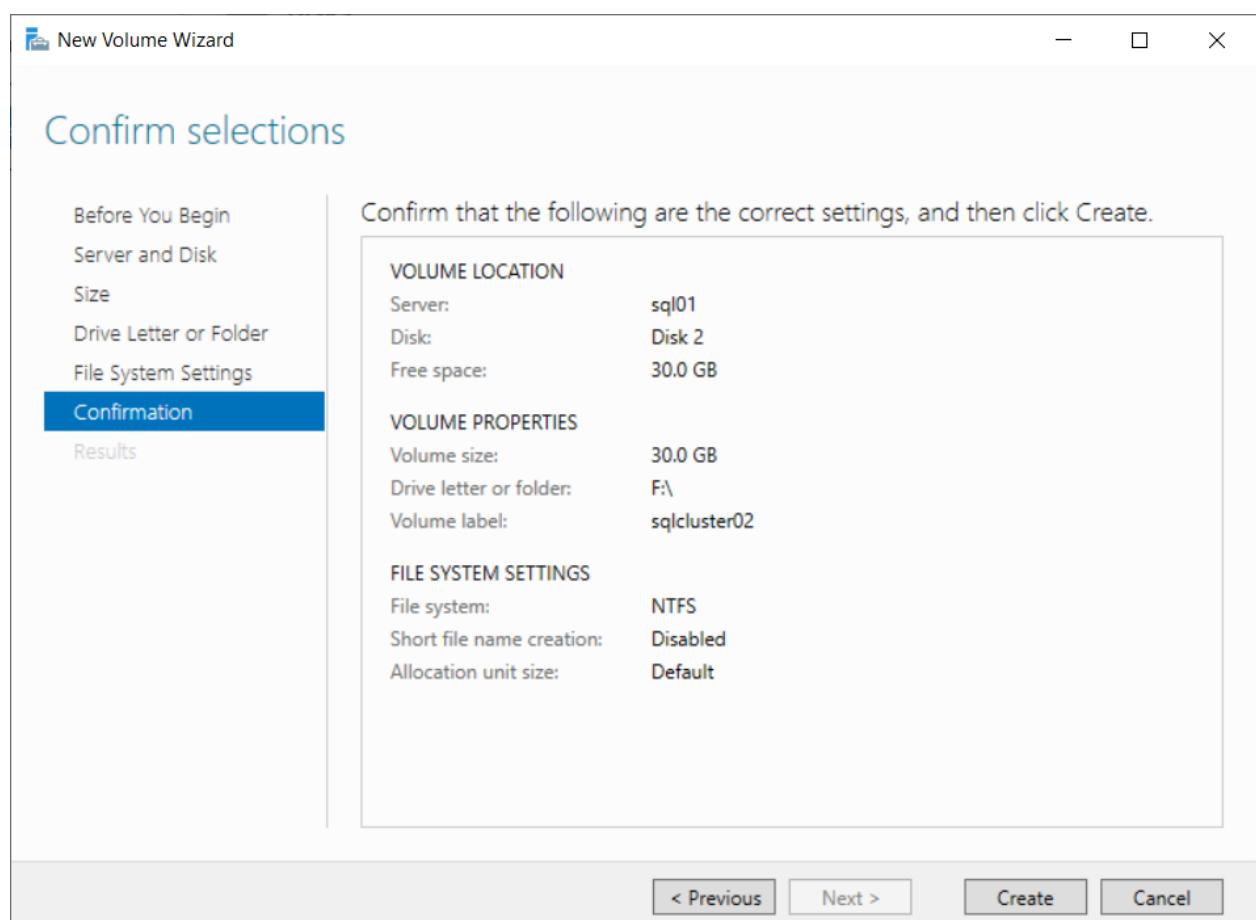
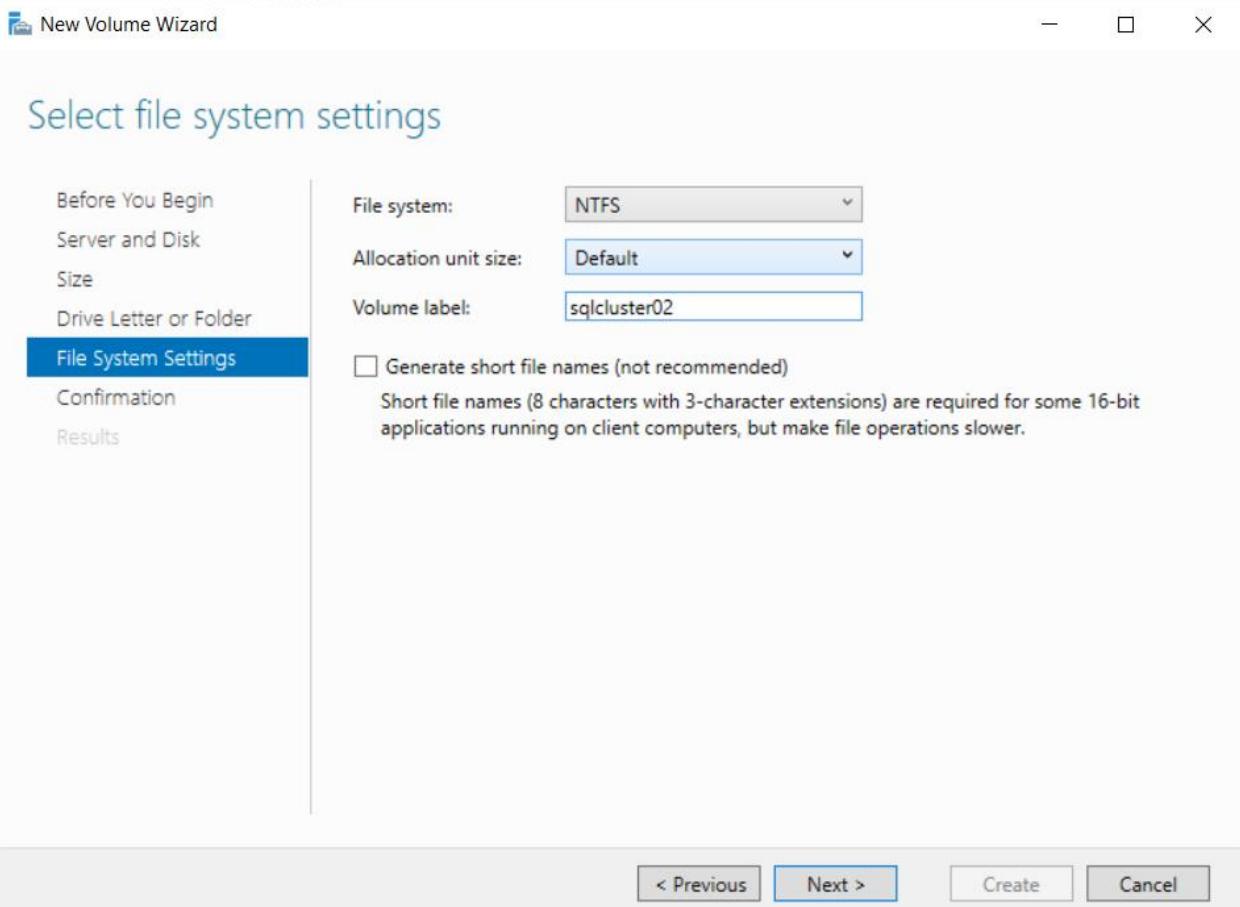
New volume disk 1

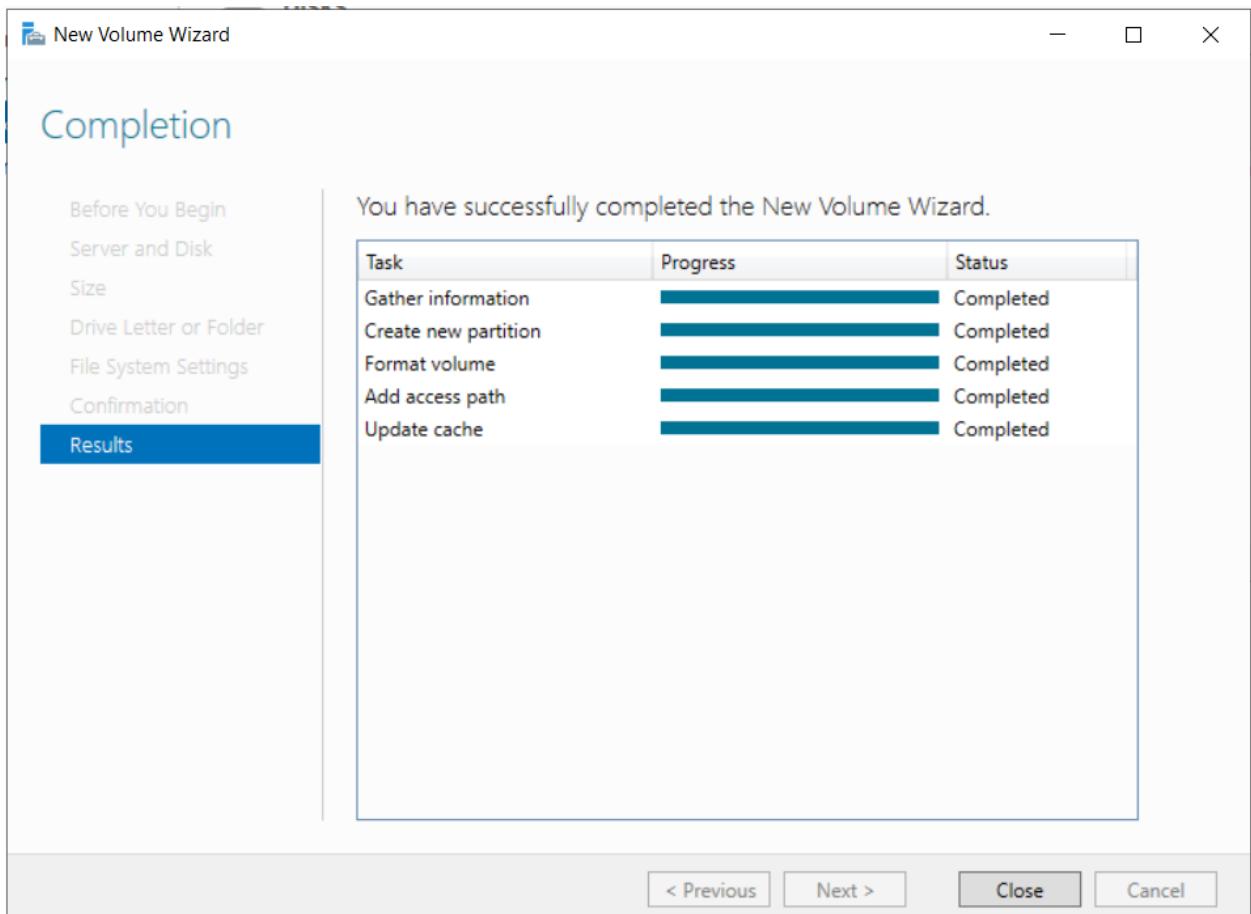
New Volume Wizard

Select file system settings

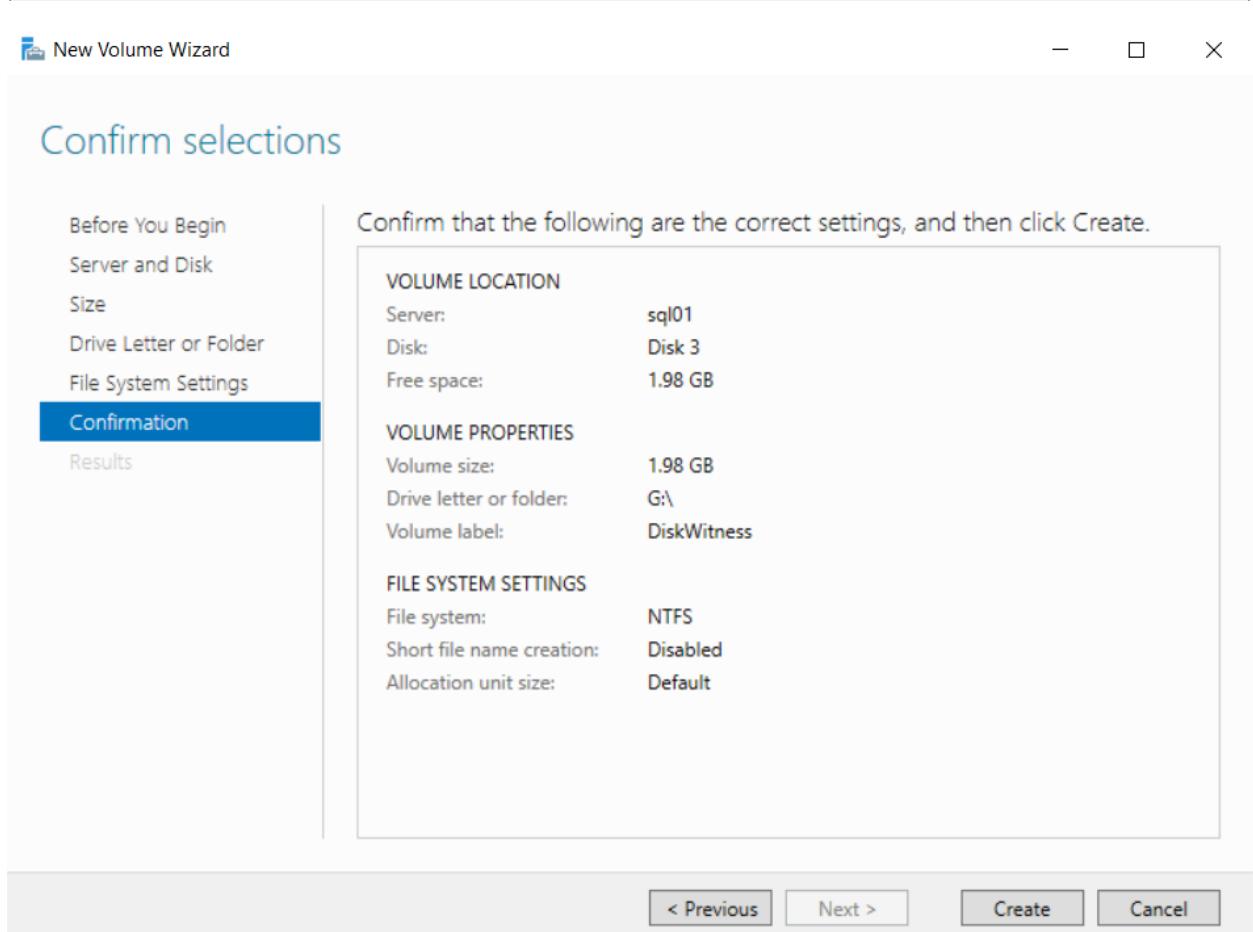
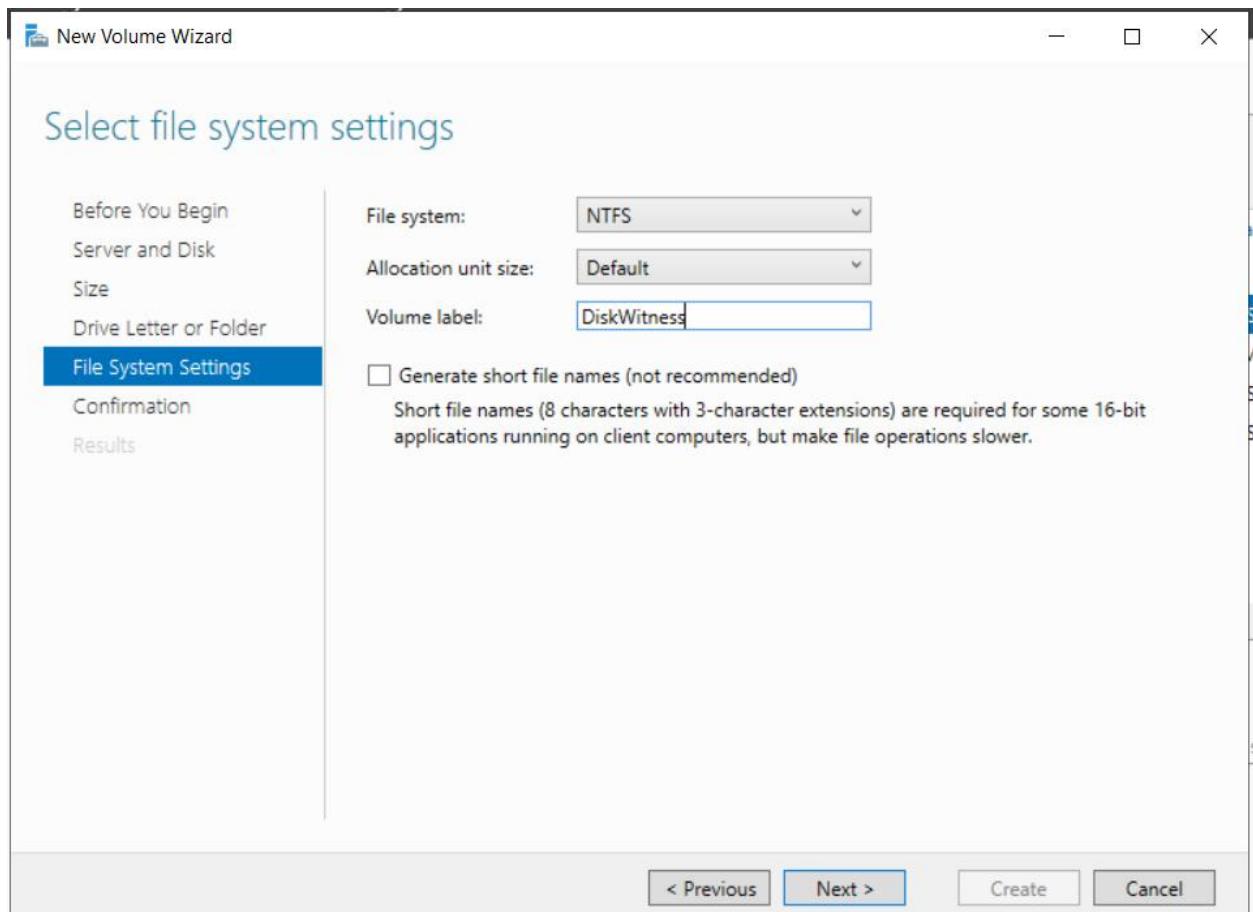
Before You Begin	File system:	NTFS
Server and Disk	Allocation unit size:	Default
Size	Volume label:	SQLcluster01
Drive Letter or Folder	<input type="checkbox"/> Generate short file names (not recommended)	
File System Settings	Short file names (8 characters with 3-character extensions) are required for some 16-bit applications running on client computers, but make file operations slower.	
Confirmation		
Results		
<input type="button" value="< Previous"/> <input type="button" value="Next >"/> <input type="button" value="Create"/> <input type="button" value="Cancel"/>		



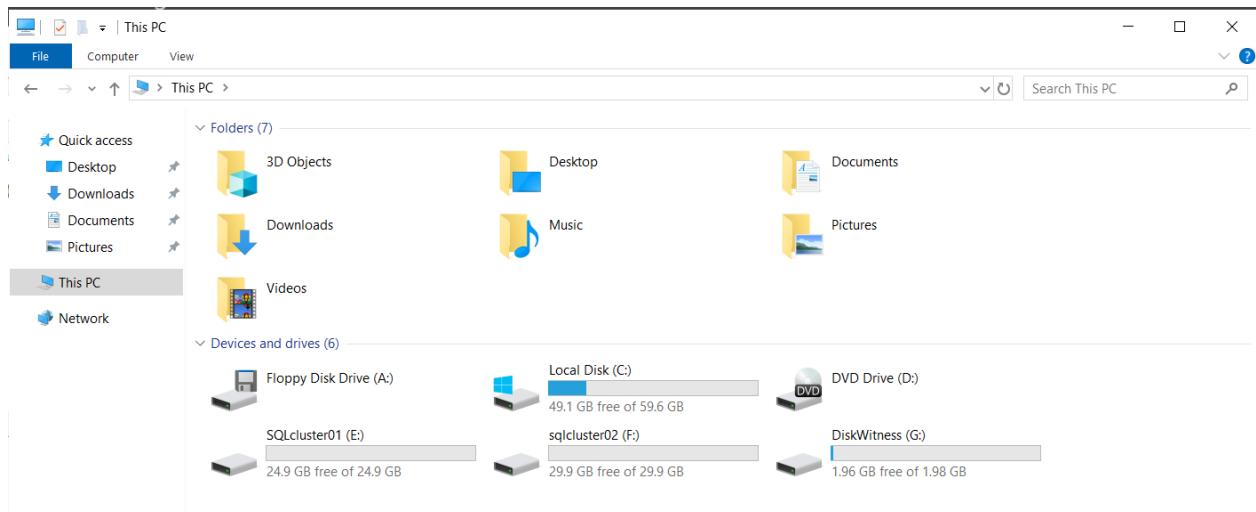




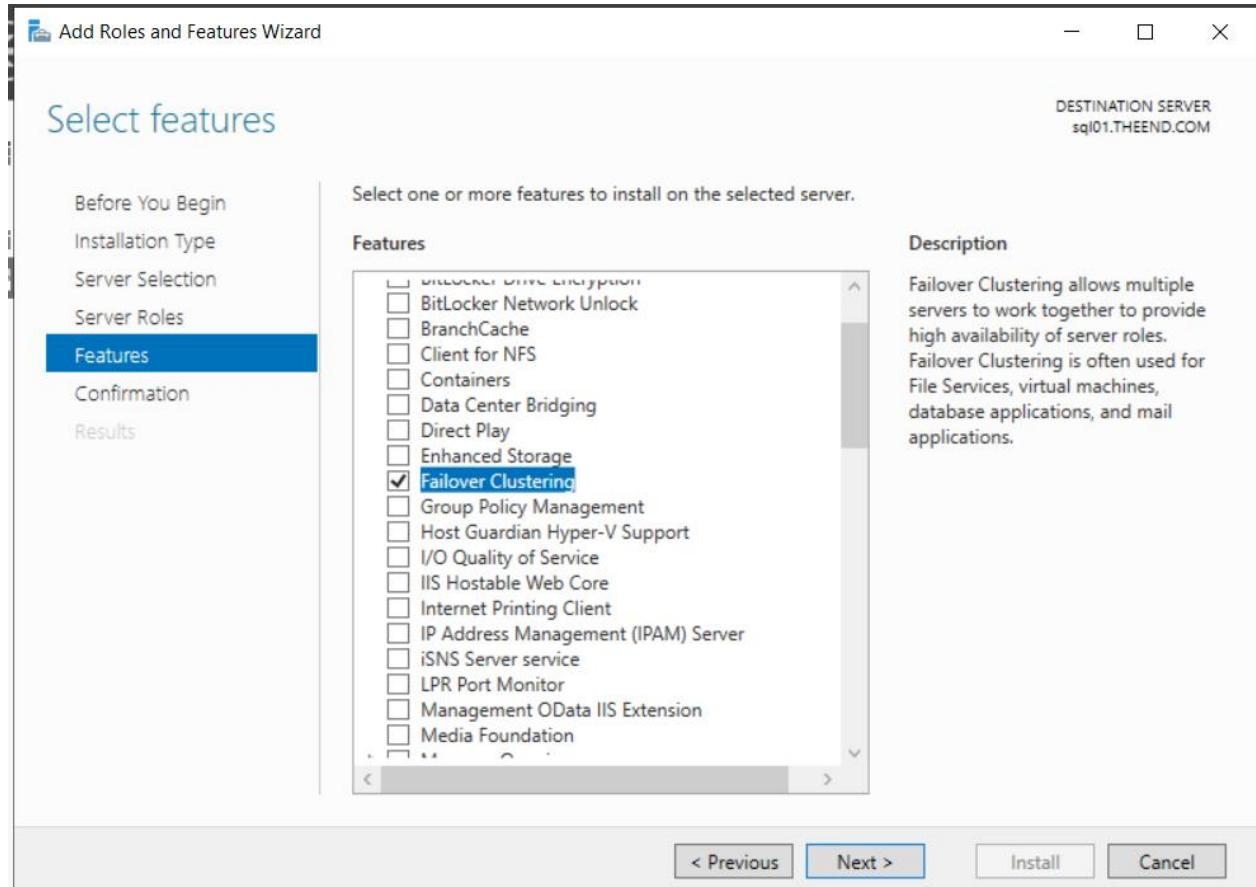
Disk 3

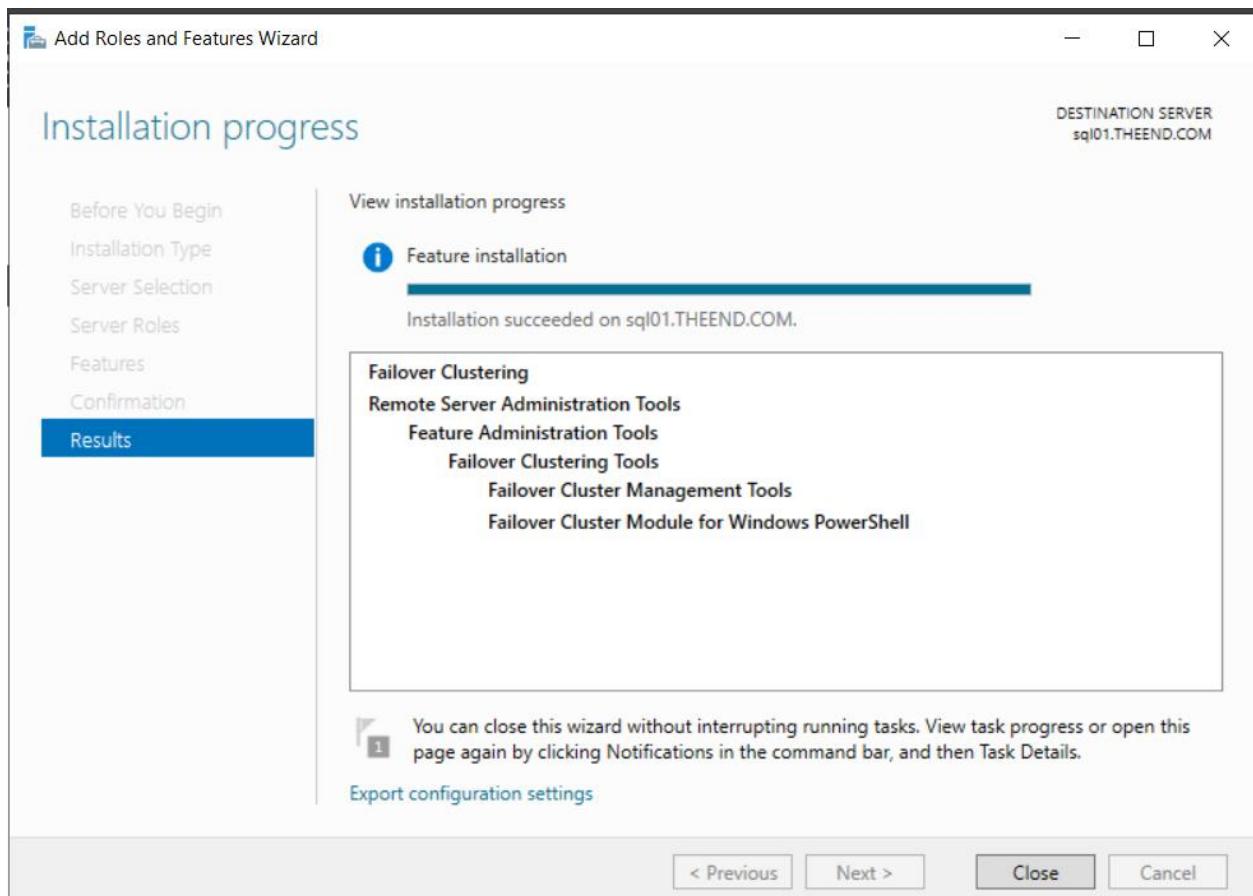


Kiểm tra 3 disk sau khi new volume

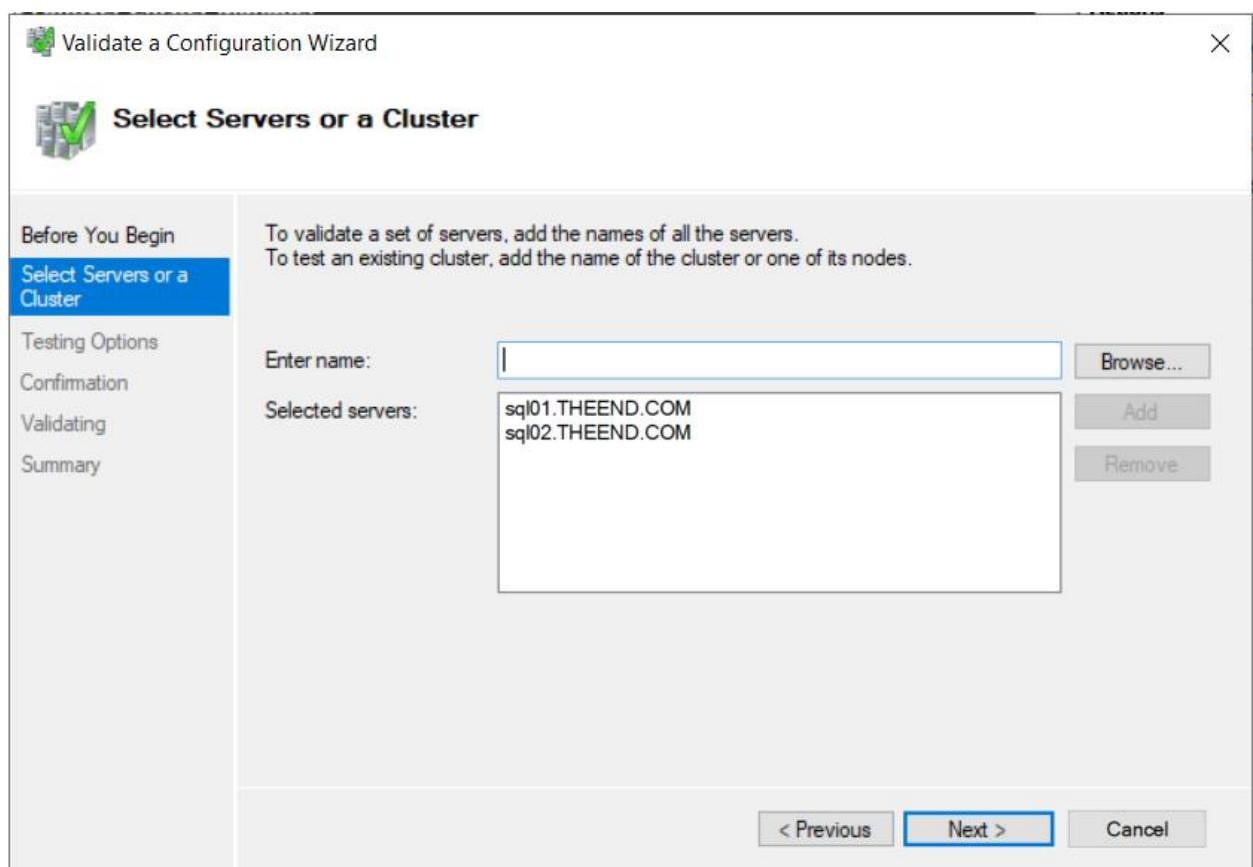


Cài đặt failover cluster





Tạo cluster



 Validate a Configuration Wizard

Testing Options

Before You Begin
Select Servers or a Cluster
Testing Options
Confirmation
Validating
Summary

Choose between running all tests or running selected tests.

The tests examine the Cluster Configuration, Hyper-V Configuration, Inventory, Network, Storage, and System Configuration.

Microsoft supports a cluster solution only if the complete configuration (servers, network, and storage) can pass all tests in this wizard. In addition, all hardware components in the cluster solution must be "Certified for Windows Server 2019."

Run all tests (recommended)
 Run only tests I select

[More about cluster validation tests](#)

< Previous **Next >** Cancel

 Validate a Configuration Wizard

Confirmation

Before You Begin
Select Servers or a Cluster
Testing Options
Confirmation
Validating
Summary

You are ready to start validation.
Please confirm that the following settings are correct:

Servers to Test	
sql01.THEEND.COM	
sql02.THEEND.COM	

Tests Selected by the User	Category
List Fibre Channel Host Bus Adapters	Inventory
List iSCSI Host Bus Adapters	Inventory
List SAS Host Bus Adapters	Inventory
List BIOS Information	Inventory

To continue, click Next.

< Previous **Next >** Cancel

Validate a Configuration Wizard

Summary

Before You Begin
Select Servers or a Cluster
Testing Options
Confirmation
Validating
Summary

Testing has completed for the tests you selected. You should review the warnings in the Report. A cluster solution is supported by Microsoft only if you run all cluster validation tests, and all tests succeed (with or without warnings).

Node	Result
sql01.THEEND.COM	Validated
sql02.THEEND.COM	Validated
Result	
List BIOS Information	Success
List Disks	Success
List Disks To Be Validated	Success
List Environment Variables	Success
List Fibre Channel Host Bus Adapters	Success

Create the cluster now using the validated nodes...

To view the report created by the wizard, click View Report.
To close this wizard, click Finish.

View Report...

Finish

Create Cluster Wizard

Access Point for Administering the Cluster

Before You Begin
Select Servers
Access Point for Administering the Cluster
Confirmation
Creating New Cluster
Summary

Type the name you want to use when administering the cluster.

Cluster Name:

The NetBIOS name is limited to 15 characters. One or more IPv4 addresses could not be configured automatically. For each network to be used, make sure the network is selected, and then type an address.

Networks	Address
<input checked="" type="checkbox"/> 192.168.1.0/24	192.168.1.170

< Previous **Next >** Cancel

Create Cluster Wizard

X

Confirmation

Before You Begin

Select Servers

Access Point for
Administering the
Cluster

Confirmation

Creating New Cluster

Summary

You are ready to create a cluster.
The wizard will create your cluster with the following settings:

Cluster

Cluster01

Node

sql01.THEEND.COM

sql02.THEEND.COM

Cluster registration

DNS and Active Directory Domain Services

Add all eligible storage to the cluster.

To continue, click Next.

< Previous

Next >

Cancel

Create Cluster Wizard

X

Summary

Before You Begin

Select Servers

Access Point for
Administering the
Cluster

Confirmation

Creating New Cluster

Summary

You have successfully completed the Create Cluster Wizard.

Node

sql01.THEEND.COM

sql02.THEEND.COM

Cluster

Cluster01

Quorum

Node and Disk Majority (Cluster Disk 3)

IP Address

192.168.1.170

To view the report created by the wizard, click View Report.
To close this wizard, click Finish.

[View Report...](#)

Finish

Cluster01

Failover Cluster Manager

File Action View Help

Cluster Cluster01.THEEND.COM

Summary of Cluster Cluster01

Cluster01 has 0 clustered roles and 2 nodes.

Name: Cluster01.THEEND.COM Networks: Cluster Network 1
Current Host Server: sql01 Subnets: 1 IPv4 and 0 IPv6
Recent Cluster Events: None in the last hour
Witness: Cluster Disk 3

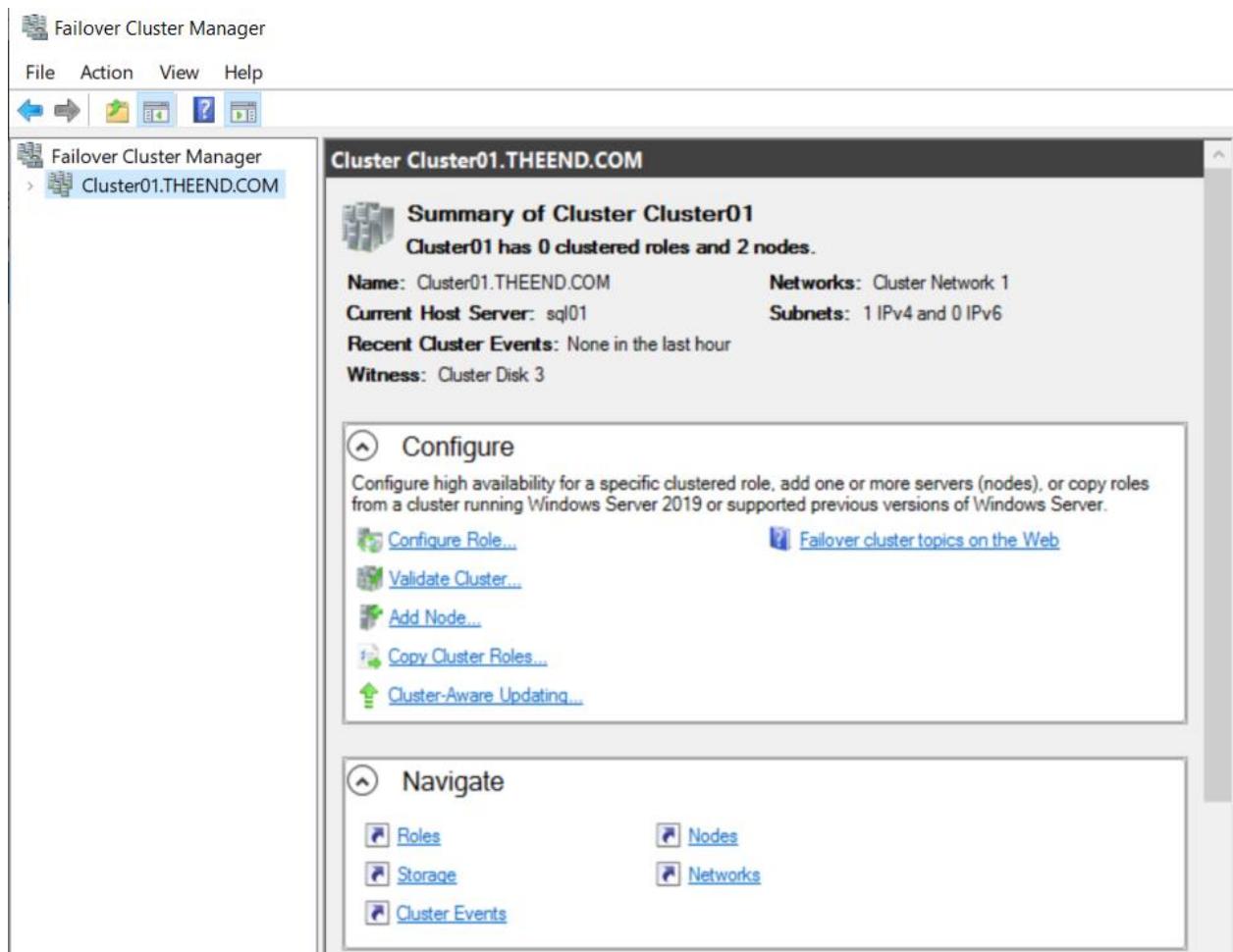
Configure

Configure high availability for a specific clustered role, add one or more servers (nodes), or copy roles from a cluster running Windows Server 2019 or supported previous versions of Windows Server.

[Configure Role...](#) [Failover cluster topics on the Web](#)
[Validate Cluster...](#)
[Add Node...](#)
[Copy Cluster Roles...](#)
[Cluster-Aware Updating...](#)

Navigate

[Roles](#) [Nodes](#)
[Storage](#) [Networks](#)
[Cluster Events](#)



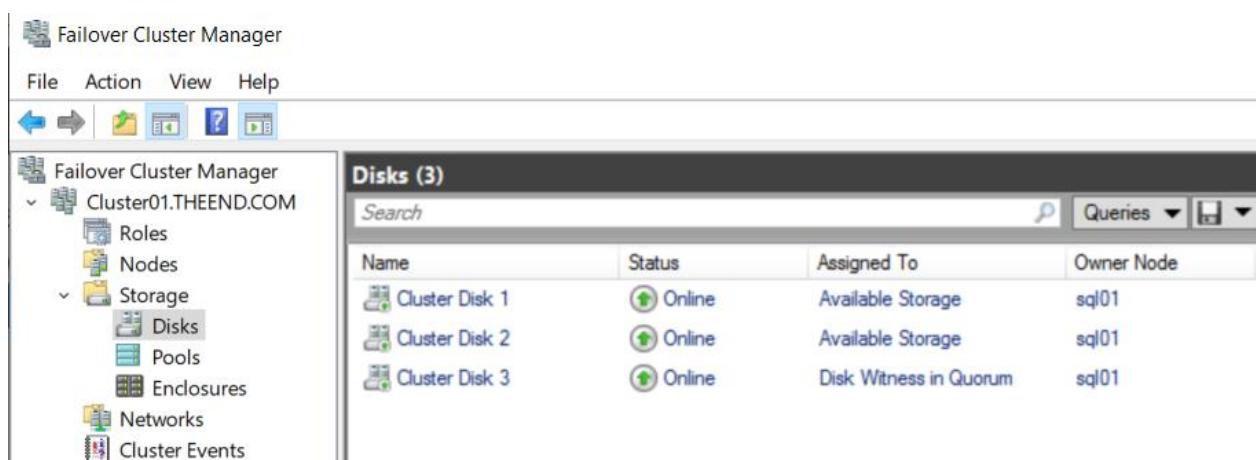
Failover Cluster Manager

File Action View Help

Cluster Cluster01.THEEND.COM

Disks (3)

Name	Status	Assigned To	Owner Node
Cluster Disk 1	Online	Available Storage	sql01
Cluster Disk 2	Online	Available Storage	sql01
Cluster Disk 3	Online	Disk Witness in Quorum	sql01



Kiểm tra tính sẵn sàng của 2 server

The screenshot shows the Failover Cluster Manager interface. The left navigation pane lists nodes under 'Cluster01.THEEND.COM'. The 'Storage' section is expanded, showing 'Disks' (selected), 'Pools', and 'Enclosures'. The right pane displays a table titled 'Disks (3)' with the following data:

Name	Status	Assigned To	Owner Node	Disk
Cluster Disk 1	Online	Available Storage	sql02	
Cluster Disk 2	Online	Available Storage	sql02	
Cluster Disk 3	Online	Disk Witness in Quorum	sql01	

Tạo sql server.

The screenshot shows the 'SQL Server 2012 Setup' window. The title bar says 'SQL Server 2012 Setup'. The main area is titled 'Setup Support Rules' with the sub-instruction: 'Setup Support Rules identify problems that might occur when you install SQL Server Setup support files. Failures must be corrected before Setup can continue.' Below this, a message states: 'Operation completed. Passed: 8. Failed 0. Warning 0. Skipped 0.' There are 'Show details >>' and 'View detailed report' buttons. In the bottom right corner, there are 'OK' and 'Cancel' buttons.



Install a SQL Server Failover Cluster

— □ ×

Setup Support Rules

Setup Support Rules identify problems that might occur when you install SQL Server Setup support files. Failures must be corrected before Setup can continue.

Setup Support Rules

- Setup Role
- Feature Selection
- Feature Rules
- Disk Space Requirements
- Error Reporting
- Cluster Installation Rules
- Ready to Install
- Installation Progress
- Complete

Operation completed. Passed: 18. Failed 0. Warning 4. Skipped 0.

[Hide details <<](#)

[Re-run](#)

[View detailed report](#)

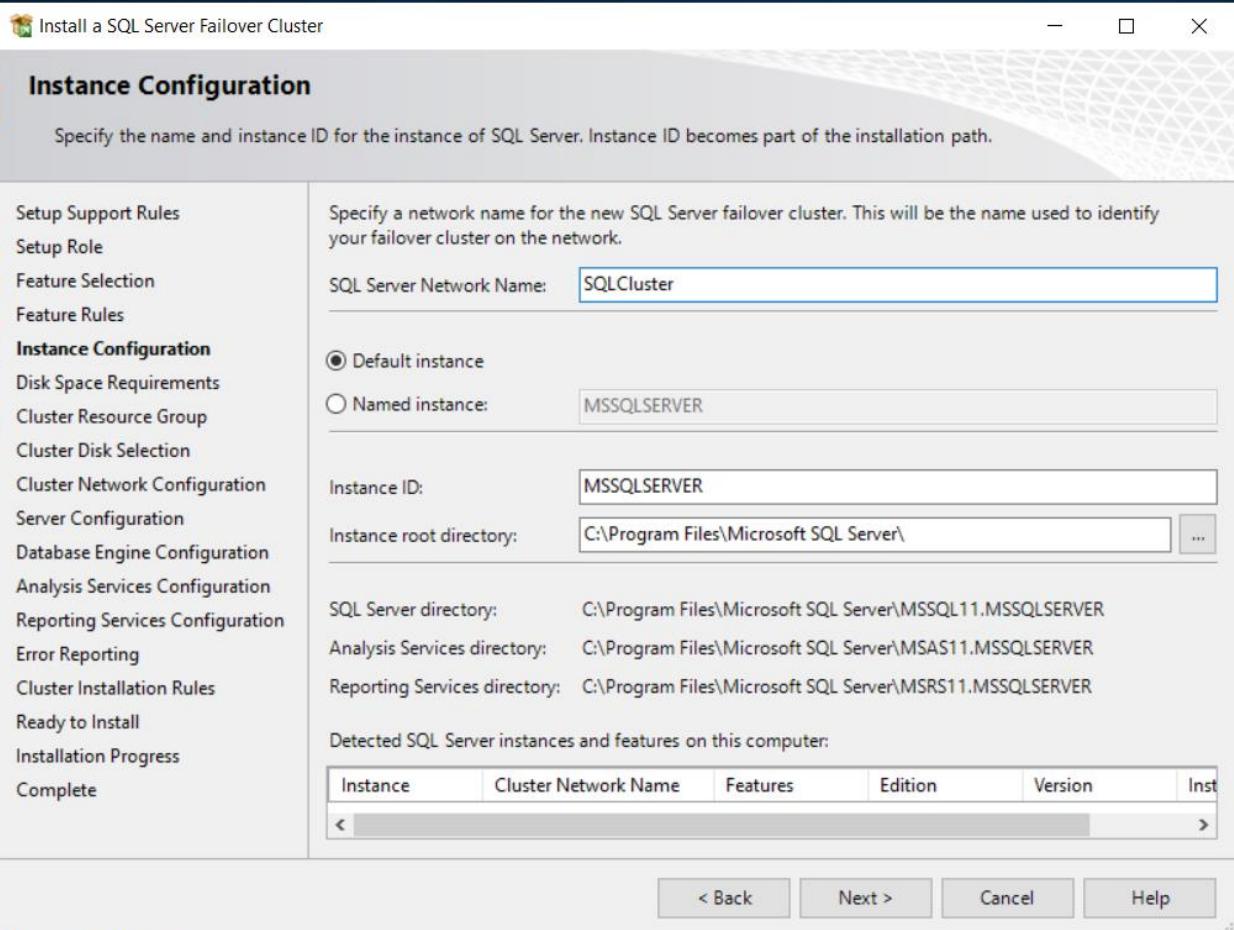
Rule	Status
⚠ Distributed Transaction Coordinator (MSDTC) clustered	Warning
🟢 Microsoft Cluster Service (MSCS) cluster verification errors	Passed
⚠ Microsoft Cluster Service (MSCS) cluster verification warnings	Warning
🟢 Remote registry service (SQL01)	Passed
🟢 Domain controller	Passed
⚠ Microsoft .NET Application Security	Warning
⚠ Network binding order	Warning
🟢 Windows Firewall	Passed
🟢 DNS settings (SQL01)	Passed
🟢 WOW64 setup	Passed
🟢 Windows Management Instrumentation (WMI) service (SQL02)	Passed

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Cluster Disk Selection

Select shared cluster disk resources for your SQL Server failover cluster.

Setup Support Rules

Setup Role

Feature Selection

Feature Rules

Instance Configuration

Disk Space Requirements

Cluster Resource Group

Cluster Disk Selection

Cluster Network Configuration

Server Configuration

Database Engine Configuration

Analysis Services Configuration

Reporting Services Configuration

Error Reporting

Cluster Installation Rules

Ready to Install

Installation Progress

Complete

Specify the shared disks to be included in the SQL Server resource cluster group. The first drive will be used as the default drive for all databases, but this can be changed on the Database Engine or Analysis Services configuration pages.

- Cluster Disk 1
 Cluster Disk 2

Available shared disks:

Qualified	Disk	Message
	Cluster Disk 1	
	Cluster Disk 2	
	Cluster Disk 3	The disk resource 'Cluster Disk 3' cannot be used because it is a cluster qu...

Refresh

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Install a SQL Server Failover Cluster

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Cluster Network Configuration

Select network resources for your SQL Server failover cluster.

Setup Support Rules

Setup Role

Feature Selection

Feature Rules

Instance Configuration

Disk Space Requirements

Cluster Resource Group

Cluster Disk Selection

Cluster Network Configuration

Server Configuration

Database Engine Configuration

Analysis Services Configuration

Reporting Services Configuration

Error Reporting

Cluster Installation Rules

Ready to Install

Installation Progress

Complete

Specify the network settings for this failover cluster:

<input checked="" type="checkbox"/>	IP Ty...	DHCP	Address	Subnet Mask	Subnet(s)	Network
<input checked="" type="checkbox"/>	IPv4	<input type="checkbox"/>	192.168.1.175	255.255.255.0	192.168.1.0/24	Cluster Network 1

Refresh

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Help

 Install a SQL Server Failover Cluster

— □ ×

Server Configuration

Specify the service accounts and collation configuration.

- Setup Support Rules
- Setup Role
- Feature Selection
- Feature Rules
- Instance Configuration
- Disk Space Requirements
- Cluster Resource Group
- Cluster Disk Selection
- Cluster Network Configuration
- Server Configuration**
- Database Engine Configuration
- Analysis Services Configuration
- Reporting Services Configuration
- Error Reporting
- Cluster Installation Rules
- Ready to Install
- Installation Progress
- Complete

Service Accounts Collation

Microsoft recommends that you use a separate account for each SQL Server service.

Service	Account Name	Password	Startup Type
SQL Server Agent	THEEND\Administrator	*****	Manual
SQL Server Database Engine	THEEND\Administrator	*****	Manual
SQL Server Analysis Services	THEEND\Administrator	*****	Manual
SQL Server Reporting Services	NT Service\ReportServer		Automatic
SQL Server Integration Services 11.0	NT Service\MsDtsServer...		Automatic
SQL Server Distributed Replay Con...	NT Service\SQL Server D...		Manual
SQL Server Distributed Replay Client	NT Service\SQL Server D...		Manual
SQL Full-text Filter Daemon Launc...	NT Service\MSSQLFDLa...		Manual
SQL Server Browser	NT AUTHORITY\LOCAL ...		Automatic

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Install a SQL Server Failover Cluster

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Database Engine Configuration

Specify Database Engine authentication security mode, administrators and data directories.

- Setup Support Rules
- Setup Role
- Feature Selection
- Feature Rules
- Instance Configuration
- Disk Space Requirements
- Cluster Resource Group
- Cluster Disk Selection
- Cluster Network Configuration
- Server Configuration
- Database Engine Configuration**
- Analysis Services Configuration
- Reporting Services Configuration
- Error Reporting
- Cluster Installation Rules
- Ready to Install
- Installation Progress
- Complete

Server Configuration Data Directories FILESTREAM

Specify the authentication mode and administrators for the Database Engine.

Authentication Mode

Windows authentication mode

Mixed Mode (SQL Server authentication and Windows authentication)

Specify the password for the SQL Server system administrator (sa) account.

Enter password:

Confirm password:

Specify SQL Server administrators

THEEND\Administrator (Administrator)

SQL Server administrators have unrestricted access to the Database Engine.

Add Current User

Add...

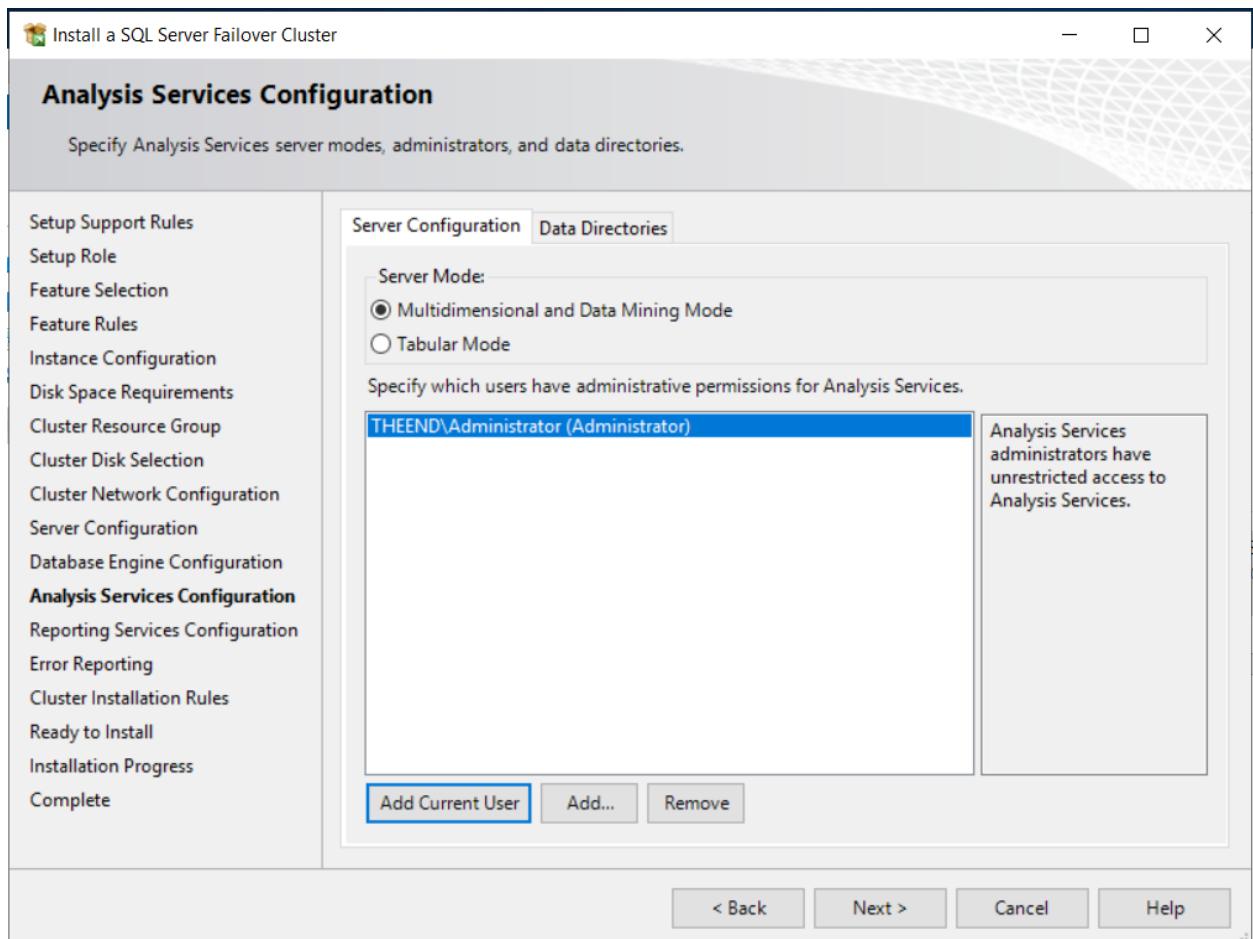
Remove

< Back

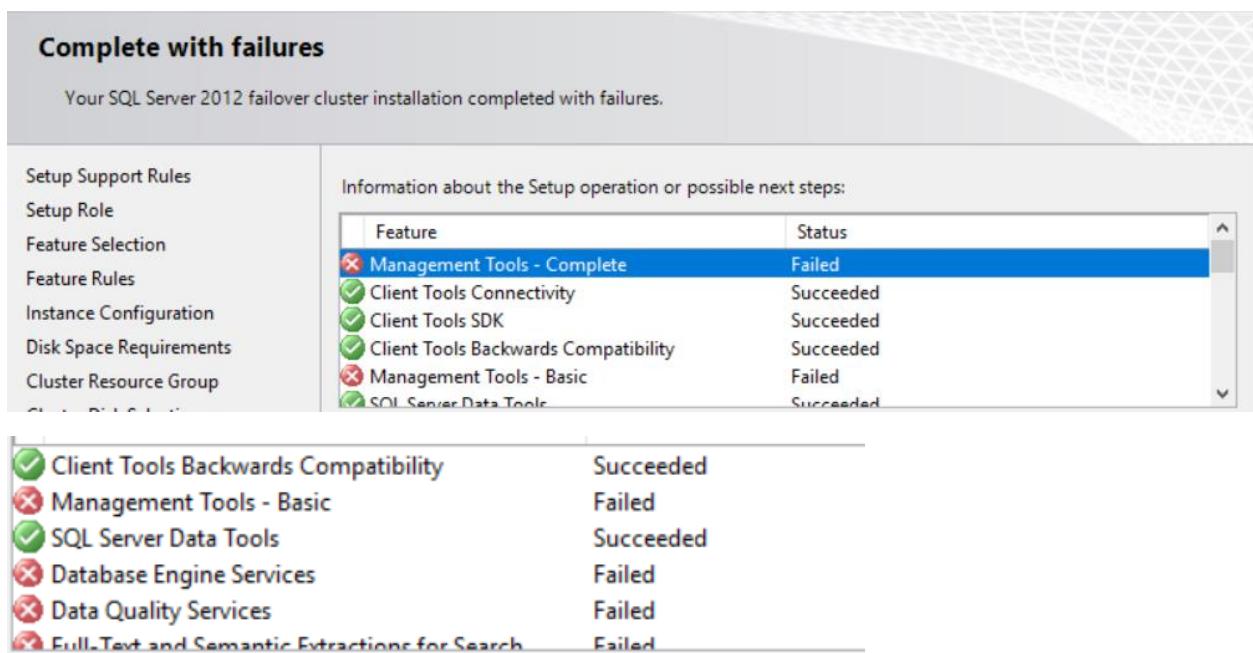
Next >

Cancel

Help



Các lỗi mà nhóm đã gặp trong quá trình cài đặt MSSQL



Information about the setup operation or possible next steps:	
Feature	Status
Full-Text and Semantic Extractions for Search	Failed
SQL Server Replication	Failed
Master Data Services	Failed
Distributed Replay Client	Succeeded
Distributed Replay Controller	Succeeded
Integration Services	Succeeded

✓ Data Quality Client	Succeeded
✗ Reporting Services - Native	Failed
✗ Analysis Services	Failed
✓ Reporting Services - SharePoint	Succeeded
✓ Reporting Services Add-in for SharePoint Prod...	Succeeded
✓ SQL Browser	Succeeded

Failover Cluster Manager

File Action View Help

Cluster01.THEEND.COM

Actions

- Configure Role...
- Virtual Machines...
- Create Empty Role
- View
- Refresh
- Help

SQL Server (MSSQLSERVER)

Name	Status	Type	Owner Node	Priority
SQL Server (MSSQLSE...)	Running	Other	sql01	Medium

Summary Resources

Failover Cluster Manager

File Action View Help

Cluster01.THEEND.COM

Disks (3)

Name	Status	Assigned To	Owner Node	Dis...
Cluster Disk 1	Offline	Available Storage	sql01	
Cluster Disk 2	Online	SQL Server (MSSQLSERV...)	sql01	
Cluster Disk 3	Offline	Disk Witness in Quorum	sql02	

B. MÁY SQL2

iSCSI Initiator Properties

X

Targets Discovery Favorite Targets Volumes and Devices RADIUS Configuration

Quick Connect
To discover and log on to a target using a basic connection, type the IP address or DNS name of the target and then click Quick Connect.

Target: Quick Connect...

Discovered targets Refresh

Name	Status
iqn.1991-05.com.microsoft:server-iscsiclusters-target	Connected

To connect using advanced options, select a target and then click Connect.

To completely disconnect a target, select the target and then click Disconnect.

For target properties, including configuration of sessions, select the target and click Properties...

For configuration of devices associated with a target, select the target and then click Devices...

OK Cancel Apply

Offline

Servers
Volumes
Disks
Storage Pools

DISKS All disks | 4 total

Number	Virtual Disk	Status	Capacity	Unallocated	Partition	Read Only	Clustered	Subsystem	Bus Type	Name
1	sql02 (4)	Offline	25.0 GB	25.0 GB	Unknown	✓		iSCSI	MSFT Virtual HD	
2		Offline	30.0 GB	30.0 GB	Unknown	✓		iSCSI	MSFT Virtual HD	
3		Offline	2.00 GB	2.00 GB	Unknown	✓		iSCSI	MSFT Virtual HD	
0		Online	60.0 GB	0.00 B	GPT			NVMe	VMware Virtual NVMe...	

Online

The screenshot shows the 'DISKS' section of the Storage Spaces Disks management interface. It displays a table of disk details for the 'sql02 (4)' volume group. The columns include Number, Virtual Disk, Status, Capacity, Unallocated, Partition, Read Only, Clustered, Subsystem, Bus Type, and Name. The disks listed are:

Number	Virtual Disk	Status	Capacity	Unallocated	Partition	Read Only	Clustered	Subsystem	Bus Type	Name
1		Online	25.0 GB	0.00 B	GPT			iSCSI	MSFT Virtual HD	
2		Online	30.0 GB	0.00 B	GPT			iSCSI	MSFT Virtual HD	
3		Online	2.00 GB	0.00 B	GPT			iSCSI	MSFT Virtual HD	
0		Online	60.0 GB	0.00 B	GPT			NVMe	VMware Virtual NVMe...	

Kiểm tra this PC

The screenshot shows the 'Devices and drives (6)' section of the Device Manager. It lists the following drives:

- Floppy Disk Drive (A:)
- Local Disk (C:)
- DVD Drive (D:)
- SQLcluster01 (E:)
- sqlcluster02 (F:)
- DiskWitness (G:)

Local Disk (C:) has 49.5 GB free of 59.6 GB. SQLcluster01 (E:) has 24.9 GB free of 24.9 GB. sqlcluster02 (F:) has 29.9 GB free of 29.9 GB. DiskWitness (G:) has 1.96 GB free of 1.98 GB.

Cài failover cluster

The screenshot shows the 'Add Roles and Features Wizard' - 'Installation progress' page. The destination server is 'sql02.THEEND.COM'. The 'Results' step is selected. The 'Feature installation' task has succeeded. The installed features include:

- Failover Clustering
- Remote Server Administration Tools
 - Feature Administration Tools
 - Failover Clustering Tools
 - Failover Cluster Management Tools
 - Failover Cluster Module for Windows PowerShell

A note at the bottom states: 'You can close this wizard without interrupting running tasks. View task progress or open this page again by clicking Notifications in the command bar, and then Task Details.'

Buttons at the bottom include: < Previous, Next >, Close, and Cancel.

Add a Failover Cluster Node

- □ ×

Setup Support Rules

Setup Support Rules identify problems that might occur when you install SQL Server Setup support files. Failures must be corrected before Setup can continue.

Setup Support Rules

Cluster Node Configuration

Service Accounts

Error Reporting

Add Node Rules

Ready to Add Node

Add Node Progress

Complete

Operation completed. Passed: 18. Failed 0. Warning 4. Skipped 0.

[Hide details <<](#)

[Re-run](#)

[View detailed report](#)

Rule	Status
⚠ Distributed Transaction Coordinator (MSDTC) clustered	Warning
✓ Microsoft Cluster Service (MSCS) cluster verification errors	Passed
⚠ Microsoft Cluster Service (MSCS) cluster verification warnings	Warning
✓ Remote registry service (SQL02)	Passed
✓ Domain controller	Passed
⚠ Microsoft .NET Application Security	Warning
⚠ Network binding order	Warning
✓ Windows Firewall	Passed
✓ DNS settings (SQL02)	Passed
✓ WOW64 setup	Passed
✓ Windows Management Instrumentation (WMI) service (SQL01)	Passed

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 Add a Failover Cluster Node

— □ ×

Cluster Node Configuration

Add a node to an existing SQL Server failover cluster.

[Setup Support Rules](#)**Cluster Node Configuration**[Cluster Network Configuration](#)[Service Accounts](#)[Error Reporting](#)[Add Node Rules](#)[Ready to Add Node](#)[Add Node Progress](#)[Complete](#)SQL Server instance name: Name of this node:

Instance Name	Cluster Network Name	Features	Nodes
MSSQLSERVER		AS	SQL01

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Cluster Network Configuration

Specify additional IP addresses that are available and valid on the current node and subnet (previously-configured SQL Server failover cluster IP addresses are shown read-only and dimmed).

[Setup Support Rules](#)[Cluster Node Configuration](#)**Cluster Network Configuration**[Service Accounts](#)[Error Reporting](#)[Add Node Rules](#)[Ready to Add Node](#)[Add Node Progress](#)[Complete](#)

Specify the network settings for this failover cluster:

<input checked="" type="checkbox"/>	IP Ty...	DHCP	Address	Subnet Mask	Subnet(s)	Network
<input checked="" type="checkbox"/>	IPv4	<input type="checkbox"/>	192.168.1.175	255.255.255.0	192.168.1.0/24	Cluster Network 1

[Refresh](#)[< Back](#)[Next >](#)[Cancel](#)[Help](#)