

MS FC

Špecializované IKT systémy Windows

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Failover cluster

Definícia

Predstavuje konfiguráciu počítačov, ktoré pracujú spoločne pre zabezpečenie vysokej dostupnosti kláštrovanej aplikácie

Vysoká dostupnosť (UPTIME)

% dostupnosť	DT za rok	DT za mesiac	DT za týždeň
90	36,5 dňa	72 hodín	16,8 hodín
99	3,65 dní	7,2 hodiny	1,68 hodín
99,9	8,76 dní	43,2 minút	10,1 minút
99,99	52,6 minút	4,32 minút	1,01 minúty
99,999	5,26 minúty	25,9 sekúnd	6,05 sekúnd
99,9999	5,26 minút	25,9 sekúnd	6,05 sekúnd

Failover cluster

Procesy

- Failover
- Failback

Prakticko použitie

- Pre databázové aplikácie
- Pre mailové aplikácie
- Pre VM

Failover cluster

Requirements

- Nie OEM OS verzia
- Certifikovaný hardvér s windows server logom
- Identická verzia OS, SP, patch level, driver, firmware, softvér
- Podporovaný storage
 - SCSI (SAS)
 - FC (incl FCoE)
 - iSCSI
- Úspešne dokončiť validačného sprievodcu

Odporúčané

- Nody sú členmi domény
- Zvlášť sieť pre internú a externú komunikáciu

Witness

Hlasovací prvok klastra

Význam pri pránom počte CLU Nodov

Môže byť disk alebo share

Možnosti konfigurácie:

- Node majority
- No majority (only witness)
- Node majority with witness

CSV

Umožňujú READ/WRITE prístup viacerých nodov naraz na rovnaký LUN (disk)

CSV je podporované na NTFS alebo ReFS file systéme

Použitie najmä pre:

- VM
- Scale-Out File server

Inštalácia

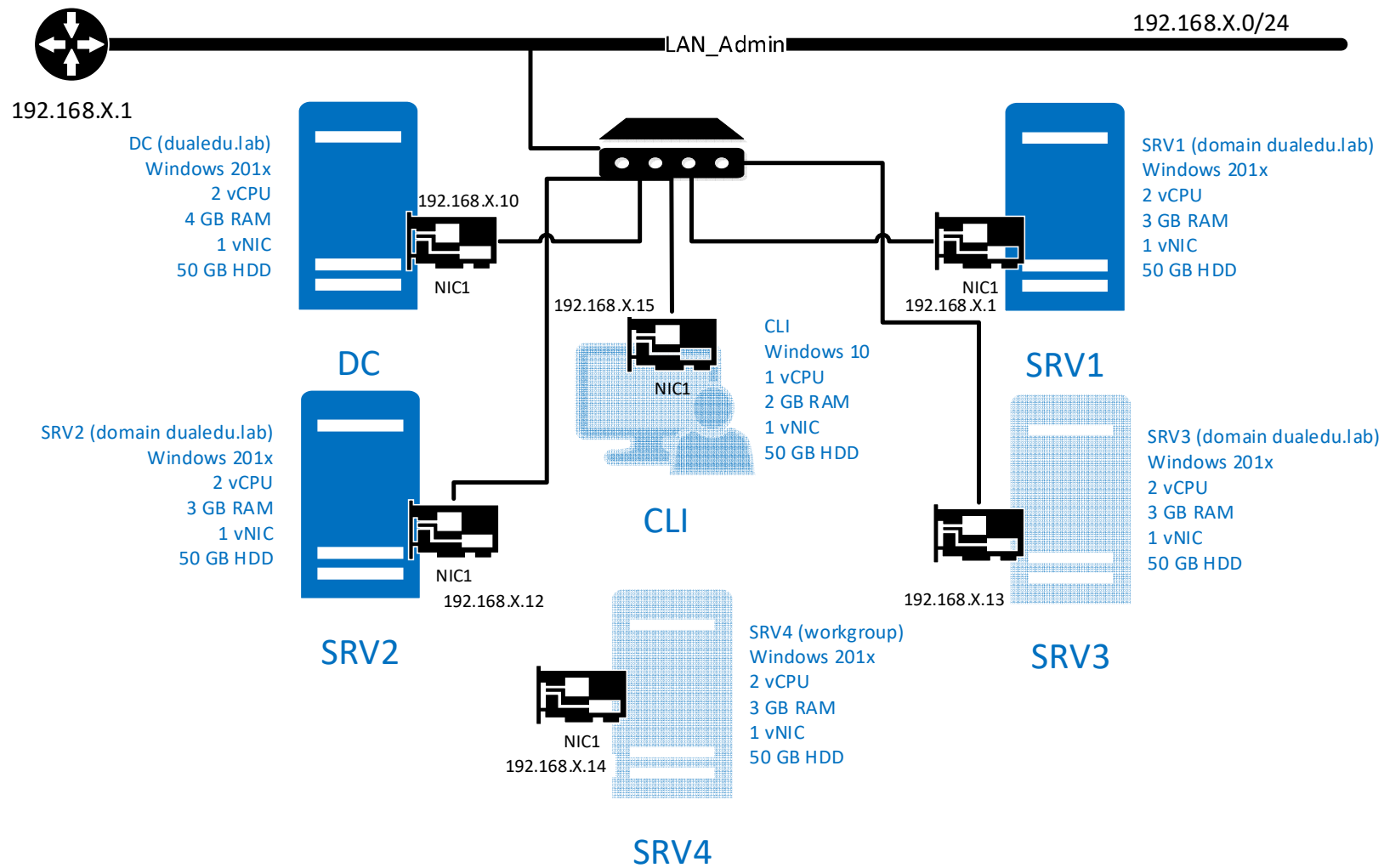
Requirements

- Cluster IP a DNS meno
- Plne nainštalované a customizované servre

Postup

1. Nainštalovanie Failover Cluster feature na každý node
2. Pripojenie sieťových diskov
3. Spustiť cluster validation wizard
4. Spustiť cluster creation wizard
 - Pridanie všetkých nodov
 - Zadanie mena a IP
5. Vytvorenie klastrovaného workloads

LAB setup



Inštalácia iSCSI Target

::1. Inštalácia iSCSI Target role na DC a pridanie 100 GB I volume

Administrator: Windows PowerShell

```
PS C:\Users\Administrator.DC> Get-Disk
```

Number	Friendly Name	Serial Number	HealthStatus	OperationalStatus	Total Size	Partition Style
0	VMware Vir...	6000c295a69d8713527c97a8610a96f3	Healthy	Online	50 GB	GPT
1	VMware Vir...	6000c29349f9a4d7ee6326a89b78f9ee	Healthy	Online	100 GB	GPT

Add Roles and Features Wizard

Select server roles

Before You Begin
Installation Type
Server Selection
Server Roles
Features
Confirmation
Results

DESTINATION SERVER
dc.dualedu.lab

Select one or more roles to install on the selected server.

Roles

- ☐ Active Directory Certificate Services
- ☒ Active Directory Domain Services (Installed)
- ☐ Active Directory Federation Services
- ☐ Active Directory Lightweight Directory Services
- ☐ Active Directory Rights Management Services
- ☐ Device Health Attestation
- ☒ DHCP Server (Installed)
- ☒ DNS Server (Installed)
- ☐ Fax Server
- ☒ File and Storage Services (3 of 12 installed)
 - ☒ File and iSCSI Services (2 of 11 installed)
 - ☒ File Server (Installed)
 - ☐ BranchCache for Network Files
 - ☐ Data Deduplication
 - ☐ DFS Namespaces
 - ☐ DFS Replication
 - ☐ File Server Resource Manager
 - ☐ File Server VSS Agent Service
 - ☒ iSCSI Target Server (Installed)

Description

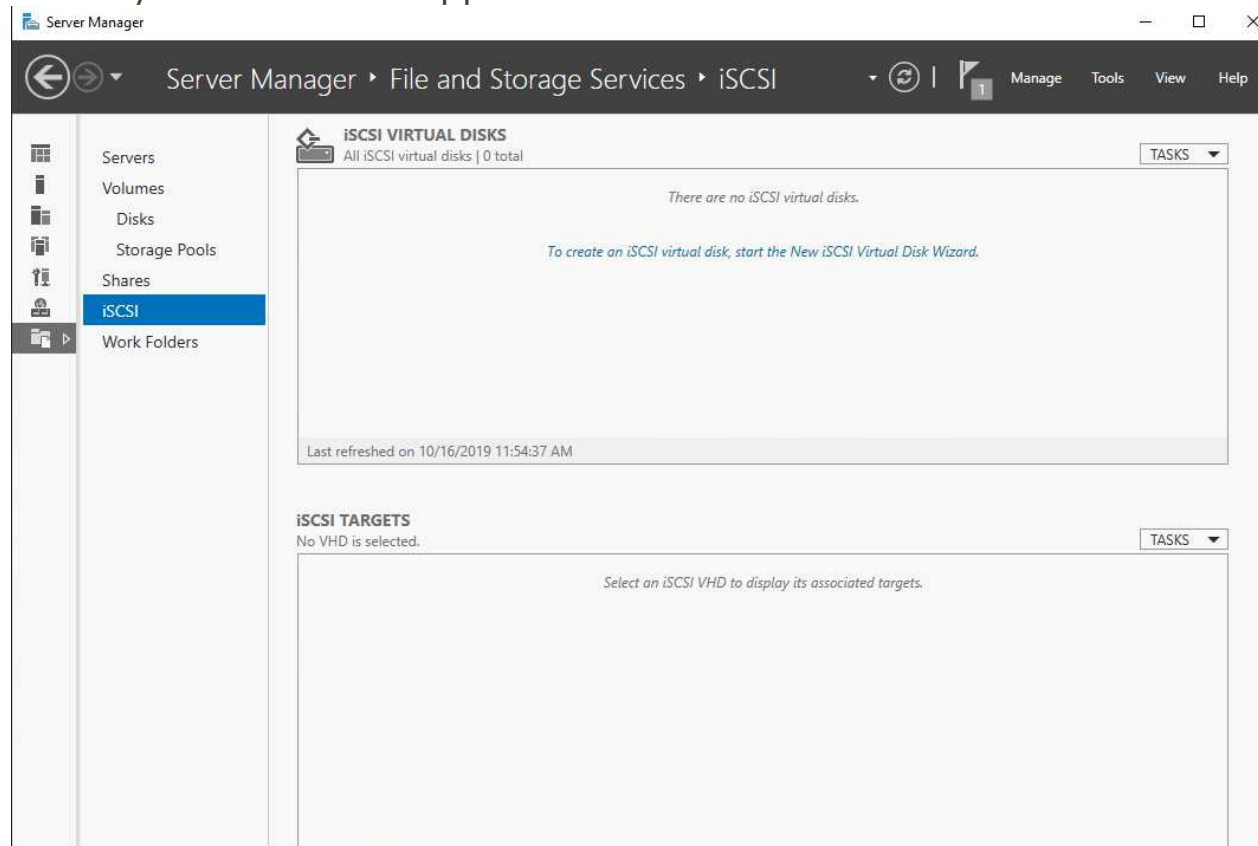
iSCSI Target Server provides services and management tools for iSCSI targets.

< Previous Next > Install Cancel

Inštalácia iSCSI Target

::2. Konfigurácia iSCSI Target role na DC

- vytvorenie 1 GB witness LUN
- Vytvorenie 10 GB Application LUN



Inštalácia iSCSI Target

::2. Konfigurácia iSCSI Target role na DC

- vytvorenie 1 GB witness LUN
- Vytvorenie 10 GB Application LUN

New iSCSI Virtual Disk Wizard

Select iSCSI virtual disk location

ISCSI Virtual Disk Location

iSCSI Virtual Disk Name

iSCSI Virtual Disk Size

iSCSI Target

Target Name and Access

Access Servers

Enable authentication ser...

Confirmation

Results

Server:

Server Name	Status	Cluster Role	Owner Node
dc	Online	Not Clustered	

The list is filtered to show only servers with the iSCSI Target Server role installed.

Storage location:

☒ Select by volume:

Volume	Free Space	Capacity	File System
C:	39.0 GB	49.4 GB	NTFS
I:	99.9 GB	100.0 GB	NTFS

The iSCSI virtual disk will be saved at \\.\I:\VirtualDisk on the selected volume.

☐ Type a custom path:

Browse...

< Previous Next > Create Cancel

Inštalácia iSCSI Target

::2. Konfigurácia iSCSI Target role na DC

- vytvorenie 1 GB witness LUN
- Vytvorenie 10 GB Application LUN

The screenshot shows the 'New iSCSI Virtual Disk Wizard' window, specifically the 'Specify iSCSI virtual disk name' step. The wizard has a sidebar on the left with the following steps: iSCSI Virtual Disk Location, iSCSI Virtual Disk Name (highlighted), iSCSI Virtual Disk Size, iSCSI Target, Target Name and Access, Access Servers, Enable authentication ser..., Confirmation, and Results. The main area contains a 'Name' field with the value 'Witness', a 'Description' text box, and a 'Path' field with the value 'I:\SCSIVirtualDisks\Witness.vhdx'. At the bottom, there are four buttons: '< Previous', 'Next >', 'Create', and 'Cancel'.

New iSCSI Virtual Disk Wizard

Specify iSCSI virtual disk name

iSCSI Virtual Disk Location

iSCSI Virtual Disk Name

iSCSI Virtual Disk Size

iSCSI Target

Target Name and Access

Access Servers

Enable authentication ser...

Confirmation

Results

Name: Witness

Description:

Path: I:\SCSIVirtualDisks\Witness.vhdx

< Previous Next > Create Cancel

Inštalácia iSCSI Target

::2. Konfigurácia iSCSI Target role na DC

- vytvorenie 1 GB witness LUN
- Vytvorenie 10 GB Application LUN

The screenshot shows the 'New iSCSI Virtual Disk Wizard' window, specifically the 'Specify iSCSI virtual disk size' step. The left sidebar contains a list of steps: 'iSCSI Virtual Disk Location', 'iSCSI Virtual Disk Name', 'iSCSI Virtual Disk Size' (which is highlighted), 'iSCSI Target', 'Target Name and Access', 'Access Servers', 'Enable authentication ser...', 'Confirmation', and 'Results'. The main area displays 'Free space: 99.9 GB'. Below this, there is a 'Size:' field with the value '1' and a unit dropdown menu set to 'GB'. Three radio button options are presented: 'Fixed size' (unselected), 'Dynamically expanding' (selected), and 'Differencing' (unselected). Each option has a descriptive paragraph. The 'Fixed size' option includes a checkbox for 'Clear the virtual disk on allocation' which is checked, followed by a note about data removal. The 'Differencing' option includes a 'Parent virtual disk path:' field with a 'Browse...' button. At the bottom of the window, there are four buttons: '< Previous', 'Next >', 'Create', and 'Cancel'.

New iSCSI Virtual Disk Wizard

Specify iSCSI virtual disk size

iSCSI Virtual Disk Location
iSCSI Virtual Disk Name
iSCSI Virtual Disk Size
iSCSI Target
Target Name and Access
Access Servers
Enable authentication ser...
Confirmation
Results

Free space: 99.9 GB

Size: 1 GB

☐ Fixed size

This type of disk provides better performance and is recommended for servers running applications with a high level of disk activity. The virtual hard disk is created using the size of the fixed virtual hard disk. It does not change when data is added or deleted.

☒ Clear the virtual disk on allocation

Note: Un-selecting is NOT RECOMMENDED. Clearing a disk to zero will remove any fragments of data that remained on underlying storage, thus protecting from information leaks.

☒ Dynamically expanding

This type of disk provides better use of physical storage space and is recommended for servers running applications that are not disk intensive. The .vhdx file is small when the disk is created and grows as data is written to it.

☐ Differencing

This type of disk is associated in a parent-child relationship with another disk that you want to leave intact. You can make changes to this virtual hard disk without affecting the parent disk and easily revert the changes later.

Parent virtual disk path: Browse...

< Previous Next > Create Cancel

Inštalácia iSCSI Target

::3. Vytvorenie nového iSCSI Target-u na DC

New iSCSI Virtual Disk Wizard

Assign iSCSI target

iSCSI Virtual Disk Location
iSCSI Virtual Disk Name
iSCSI Virtual Disk Size
iSCSI Target
Target Name and Access
Access Servers
Enable authentication ser...
Confirmation
Results

Assign this iSCSI virtual disk to an existing iSCSI target or create a new target for it.

☐ Existing iSCSI target:

Target Name	Initiator IDs	Description
-------------	---------------	-------------

☒ New iSCSI target

< Previous Next > Create Cancel

Inštalácia iSCSI Target

::3. Vytvorenie nového iSCSI Target-u na DC

The screenshot shows the 'New iSCSI Virtual Disk Wizard' window, specifically the 'Specify target name' step. The window has a title bar with the text 'New iSCSI Virtual Disk Wizard' and standard Windows window controls. On the left side, there is a vertical list of steps: 'iSCSI Virtual Disk Location', 'iSCSI Virtual Disk Name', 'iSCSI Virtual Disk Size', 'iSCSI Target', 'Target Name and Access' (which is highlighted with a blue background), 'Access Servers', 'Enable authentication per...', 'Confirmation', and 'Results'. The main area of the wizard is titled 'Specify target name' and contains two input fields: 'Name:' with the text 'iSCSITargetDC' entered, and 'Description:' which is an empty text box. At the bottom of the window, there are four buttons: '< Previous', 'Next >' (highlighted with a blue border), 'Create', and 'Cancel'.

Inštalácia iSCSI Target

::3. Vytvorenie nového iSCSI Target-u na DC

New iSCSI Virtual Disk Wizard

Specify access servers

iSCSI Virtual Disk Location
iSCSI Virtual Disk Name
iSCSI Virtual Disk Size
iSCSI Target
Target Name and Access
Access Servers
Enable authentication ser...
Confirmation
Results

Click Add to specify the iSCSI initiator(s) that will access this iSCSI virtual disk.

Type	Value
IPAddress	192.168.100.11
IPAddress	192.168.100.12

Add... Remove

< Previous Next > Create Cancel

Inštalácia iSCSI Target

::3. Vytvorenie nového iSCSI Target-u na DC

New iSCSI Virtual Disk Wizard

Enable Authentication

Optionally, enable the CHAP protocol to authenticate initiator connections, or enable reverse CHAP to allow the initiator to authenticate the iSCSI target.

☐ Enable CHAP:

User name:

Password:

Confirm password:

☐ Enable reverse CHAP:

User name:

Password:

Confirm password:

< Previous Next > Create Cancel

Inštalácia iSCSI Target

::3. Vytvorenie nového iSCSI Target-u na DC

The screenshot shows the 'New iSCSI Virtual Disk Wizard' window, specifically the 'Confirm selections' step. The window title is 'New iSCSI Virtual Disk Wizard'. On the left, there is a list of steps: 'ISCSI Virtual Disk Location', 'ISCSI Virtual Disk Name', 'ISCSI Virtual Disk Size', 'ISCSI Target', 'Target Name and Access', 'Access Servers', 'Enable authentication ser...', 'Confirmation' (which is highlighted in blue), and 'Results'. The main area of the window contains the text 'Confirm that the following are the correct settings, and then click Create.' followed by a list of settings organized into sections: 'ISCSI VIRTUAL DISK LOCATION' (Server: dc, Cluster role: Not Clustered, Path: I:\ISCSI\VirtualDisks\Witness.vhdx), 'ISCSI VIRTUAL DISK PROPERTIES' (Name: Witness, Size: 1.00 GB), 'TARGET PROPERTIES' (Name: iscsitargetdc), 'ACCESS SERVERS' (IP Address: 192.168.100.11, IP Address: 192.168.100.12), and 'SECURITY' (CHAP: Disabled, Reverse CHAP: Disabled). At the bottom right, there are four buttons: '< Previous', 'Next >', 'Create', and 'Cancel'.

New iSCSI Virtual Disk Wizard

Confirm selections

ISCSI Virtual Disk Location
ISCSI Virtual Disk Name
ISCSI Virtual Disk Size
ISCSI Target
Target Name and Access
Access Servers
Enable authentication ser...
Confirmation
Results

Confirm that the following are the correct settings, and then click Create.

ISCSI VIRTUAL DISK LOCATION
Server: dc
Cluster role: Not Clustered
Path: I:\ISCSI\VirtualDisks\Witness.vhdx

ISCSI VIRTUAL DISK PROPERTIES
Name: Witness
Size: 1.00 GB

TARGET PROPERTIES
Name: iscsitargetdc

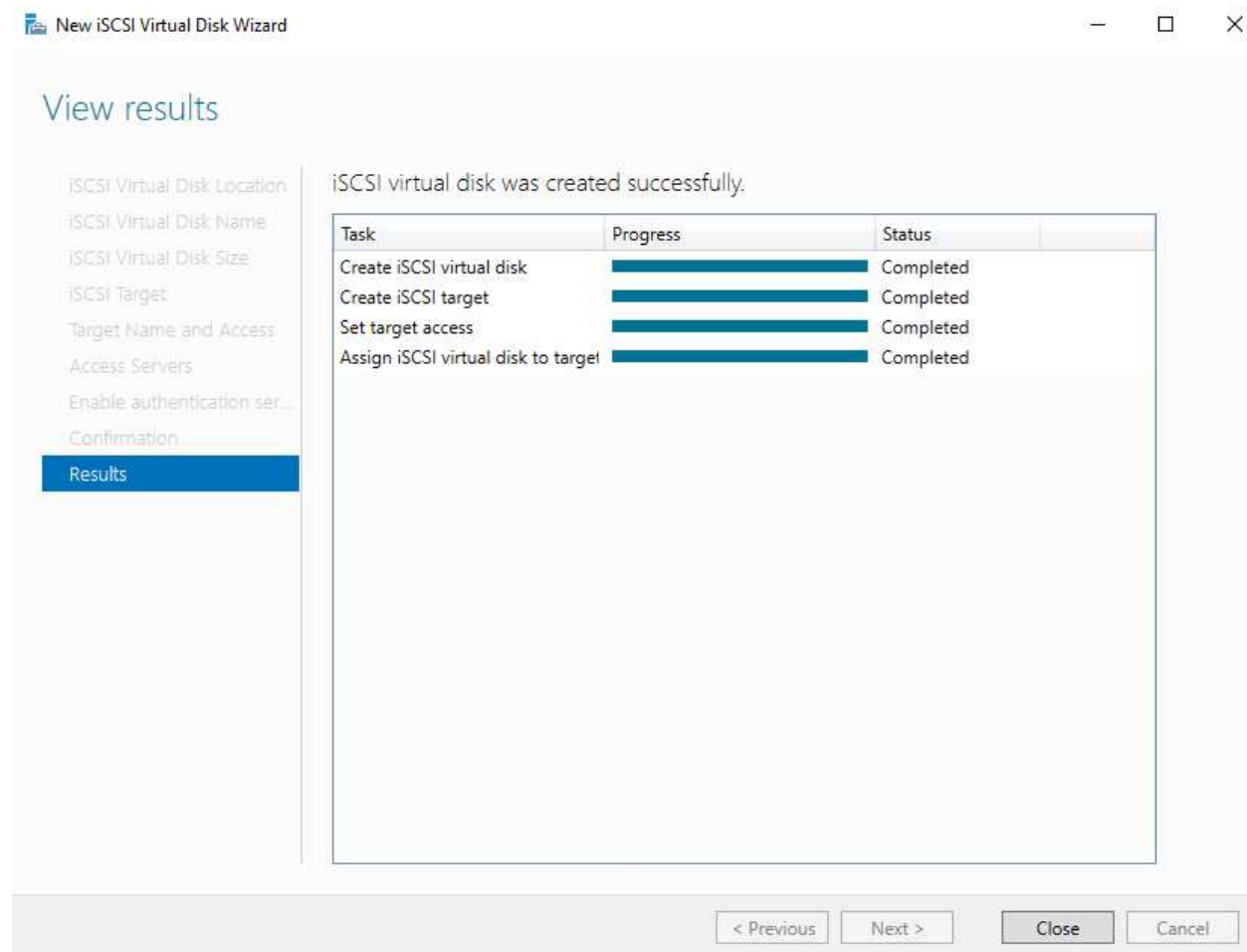
ACCESS SERVERS
IP Address: 192.168.100.11
IP Address: 192.168.100.12

SECURITY
CHAP: Disabled
Reverse CHAP: Disabled

< Previous Next > Create Cancel

Inštalácia iSCSI Target

::3. Vytvorenie nového iSCSI Target-u na DC



Inštalácia iSCSI Target

::4. Opakovanie krokov pre vytvorenie 10 GB Application LUN-u

The screenshot shows the Windows Server Manager interface. The left-hand navigation pane has 'iSCSI' selected. The main area is divided into two sections: 'iSCSI VIRTUAL DISKS' and 'iSCSI TARGETS'.

iSCSI VIRTUAL DISKS

Header: All iSCSI virtual disks | 1 total

Path	Status	Virtual Disk Status	Target Name	Target Status	Initiator ID
dc (1)					
I:\VSCSIVirtualDisks\Witness.vhdx	Not Connected	iscsitargetdc	Not Connected	IPAddress:192.168.100.11, IPAddress:192.168.100.12	

A context menu is open over the table with the following options: 'New iSCSI Virtual Disk...', 'Refresh', and 'Import iSCSI Virtual Disk...'. Below the table, it says 'Last refreshed on 10/16/2019 11:54:37 AM'.

iSCSI TARGETS

Header: I:\VSCSIVirtualDisks\Witness.vhdx on dc

Name	Server Name	Target IQN	Target Status	Initiator ID
iscsitargetdc	dc	iqn.1991-05.com.microsoft:dc-iscsitargetdc-target	Not Connected	IPAddress:192.168.100.11, IPAddress:192.168.100.12

Inštalácia iSCSI Target

::4. Opakovanie krokov pre vytvorenie 10 GB Application LUN-u

New iSCSI Virtual Disk Wizard

Assign iSCSI target

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

Assign this iSCSI virtual disk to an existing iSCSI target or create a new target for it.

☒ Existing iSCSI target:

Target Name	Initiator IDs	Description
iscsitargetdc	IPAddress:192.168.100.11, IPAddress:...	

☐ New iSCSI target

< Previous Next > Create Cancel

Inštalácia iSCSI Target

::4. Opakovanie krokov pre vytvorenie 10 GB Application LUN-u

The screenshot shows the 'New iSCSI Virtual Disk Wizard' window, specifically the 'Confirm selections' step. The window title is 'New iSCSI Virtual Disk Wizard'. On the left, there is a navigation pane with the following items: 'iSCSI Virtual Disk Location', 'iSCSI Virtual Disk Name', 'iSCSI Virtual Disk Size', 'iSCSI Target', 'Confirmation' (which is highlighted in blue), and 'Results'. The main area of the window contains the text 'Confirm that the following are the correct settings, and then click Create.' Below this text is a large box containing the following settings:

- ISCSI VIRTUAL DISK LOCATION**
 - Server: dc
 - Cluster role: Not Clustered
 - Path: I:\ISCSIVirtualDisks\Application.vhdx
- ISCSI VIRTUAL DISK PROPERTIES**
 - Name: Application
 - Size: 10.0 GB
- TARGET PROPERTIES**
 - Name: iscsitargetdc
- ACCESS SERVERS**
 - IP Address: 192.168.100.11
 - IP Address: 192.168.100.12
- SECURITY**
 - CHAP: Disabled
 - Reverse CHAP: Disabled

At the bottom of the window, there are four buttons: '< Previous', 'Next >', 'Create', and 'Cancel'.

Validácia konfigurácie #1

```
Administrator: Windows PowerShell

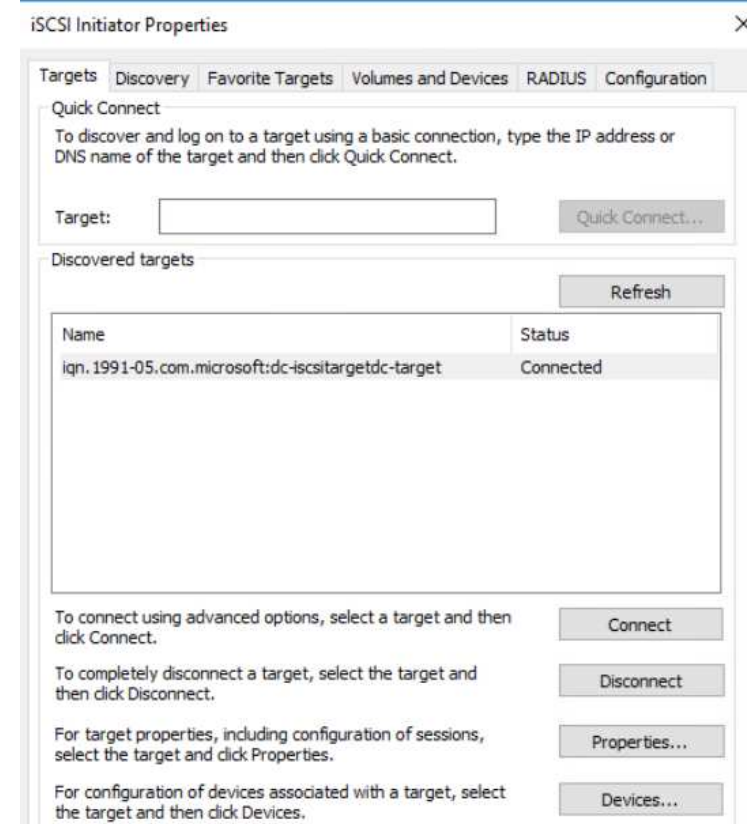
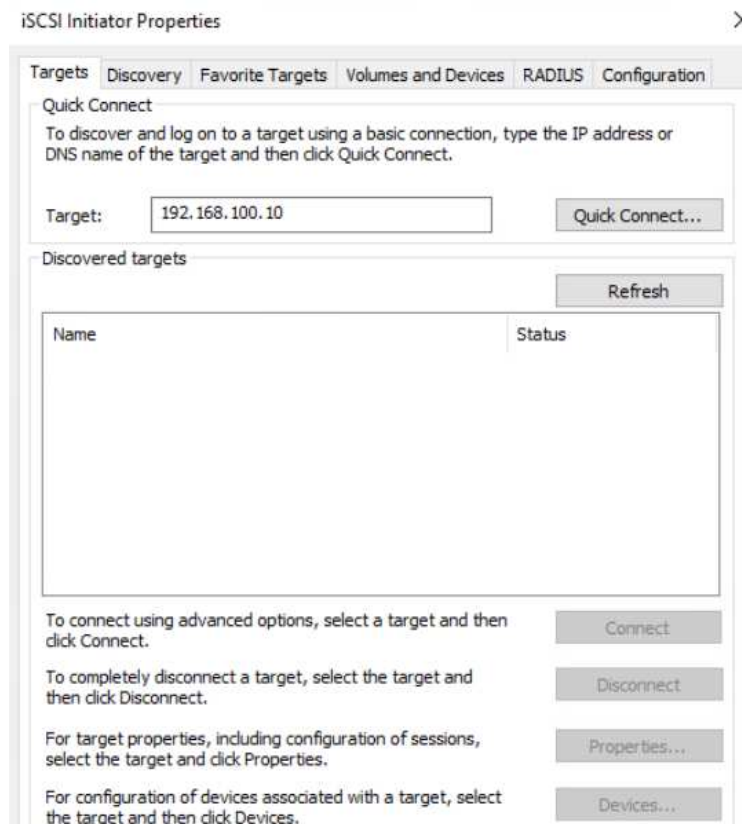
PS C:\Users\Administrator.DC> Get-IscsiVirtualDisk | ft Path,Size

Path                                     Size
----                                     -
I:\iSCSIVirtualDisks\Application.vhdx  10737418240
I:\iSCSIVirtualDisks\Witness.vhdx      1073741824

PS C:\Users\Administrator.DC>
```

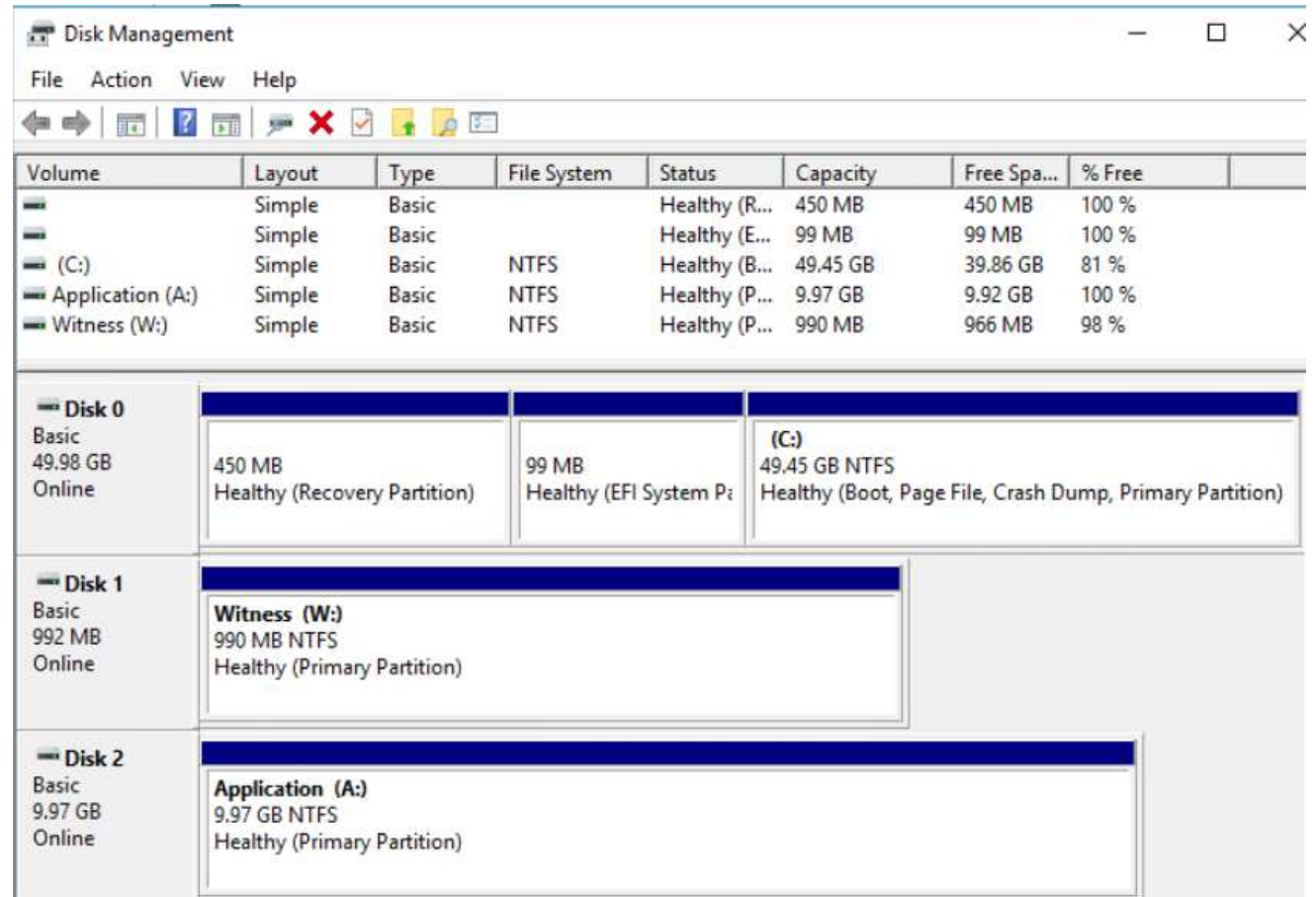
Pripojenie iSCSI LUN-ov

::5. Pripojenie LUN-ov na oba SRV1 a SRV2 cez iSCSI Initiator tool



Format iSCSI LUN-ov

::6. Naformatovanie LUN-ov na jednom z nodov



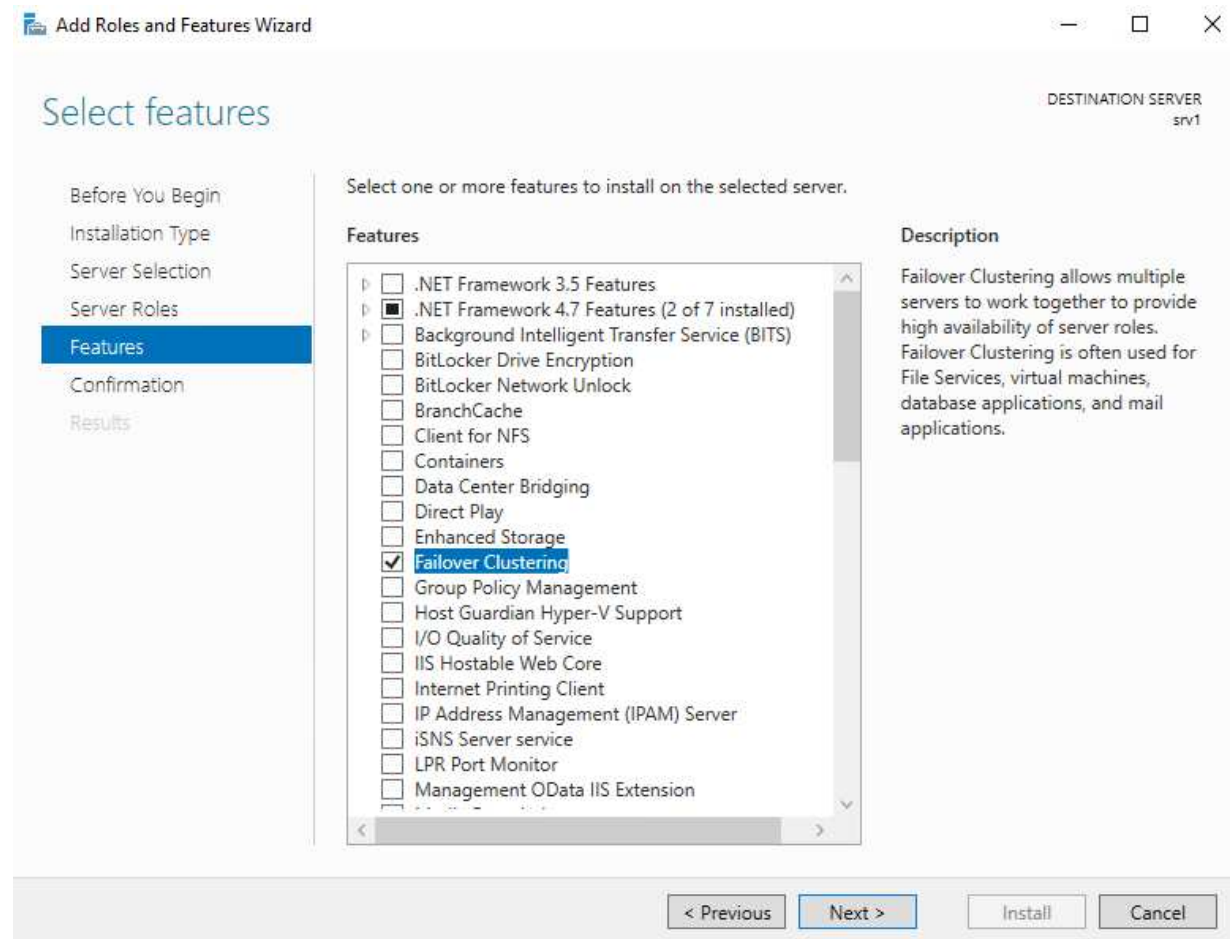
The screenshot shows the Windows Disk Management console. At the top, a table lists all volumes on the system. Below this, the details for three disks are shown: Disk 0, Disk 1, and Disk 2. Each disk detail view shows its layout, type, and the specific partitions it contains.

Volume	Layout	Type	File System	Status	Capacity	Free Spa...	% Free
	Simple	Basic		Healthy (R...	450 MB	450 MB	100 %
	Simple	Basic		Healthy (E...	99 MB	99 MB	100 %
(C:)	Simple	Basic	NTFS	Healthy (B...	49.45 GB	39.86 GB	81 %
Application (A:)	Simple	Basic	NTFS	Healthy (P...	9.97 GB	9.92 GB	100 %
Witness (W:)	Simple	Basic	NTFS	Healthy (P...	990 MB	966 MB	98 %

Disk	Layout	Type	File System	Status	Capacity	Free Space	% Free
Disk 0	Simple	Basic	NTFS	Healthy (R...)	450 MB	450 MB	100 %
Disk 1	Simple	Basic	NTFS	Healthy (E...)	99 MB	99 MB	100 %
Disk 2	Simple	Basic	NTFS	Healthy (B...)	49.45 GB	39.86 GB	81 %

Inštalácia MS FC

::7. Inštalácia role na SRV1 ,SRV2 – Server manager (GUI)



Inštalácia MS FC

::7. Inštalácia role na SRV1 ,SRV2 - PowerShell

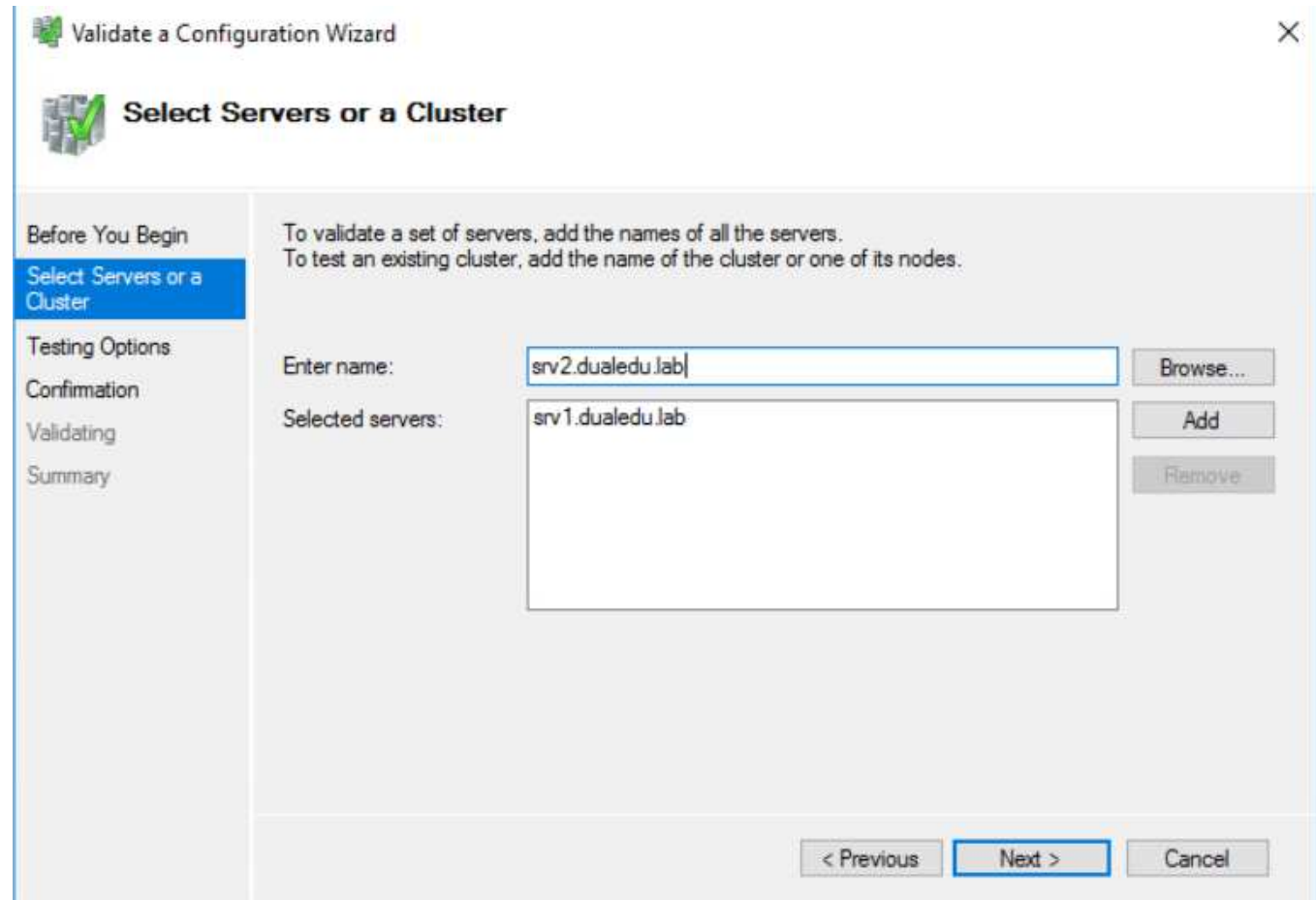
```
Administrator: Windows PowerShell
PS C:\Users\Administrator>
PS C:\Users\Administrator>
PS C:\Users\Administrator> Get-WindowsFeature -Name *cluster*

Display Name                                Name                                Install State
-----
[ ] Failover Clustering                    Failover-Clustering                Available
    [ ] Failover Clustering Tools          RSAT-Clustering                    Available
        [ ] Failover Cluster Management Tools RSAT-Clustering-Mgmt                Available
        [ ] Failover Cluster Module for Windows ... RSAT-Clustering-Powe...            Available
        [ ] Failover Cluster Automation Server  RSAT-Clustering-Auto...            Available
        [ ] Failover Cluster Command Interface RSAT-Clustering-CmdI...            Available

PS C:\Users\Administrator> Install-WindowsFeature -Name Failover-Clustering -IncludeAllSubFeature -IncludeManagementTools
```

Validation wizard

::8. Run validation wizard cez Falover cluster manager mmc



The screenshot shows a Windows-style dialog box titled "Validate a Configuration Wizard" with a close button (X) in the top right corner. The main heading is "Select Servers or a Cluster" with a green checkmark icon. On the left is a vertical navigation pane with the following items: "Before You Begin", "Select Servers or a Cluster" (which is highlighted with a blue background), "Testing Options", "Confirmation", "Validating", and "Summary". The main area contains the following text: "To validate a set of servers, add the names of all the servers. To test an existing cluster, add the name of the cluster or one of its nodes." Below this text are two input fields. The first is labeled "Enter name:" and contains the text "srv2.dualedu.lab". To its right is a "Browse..." button. The second is a list box labeled "Selected servers:" which contains the text "srv1.dualedu.lab". To the right of the list box are two buttons: "Add" and "Remove". At the bottom of the dialog are three buttons: "< Previous", "Next >" (which is highlighted with a blue border), and "Cancel".

Validate a Configuration Wizard

Select Servers or a Cluster

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

To validate a set of servers, add the names of all the servers.
To test an existing cluster, add the name of the cluster or one of its nodes.

Enter name: Browse...

Selected servers: Add Remove

< Previous Next > Cancel

Validation wizard

::8. Run validation wizard cez Falover cluster manager mmc

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 2016."

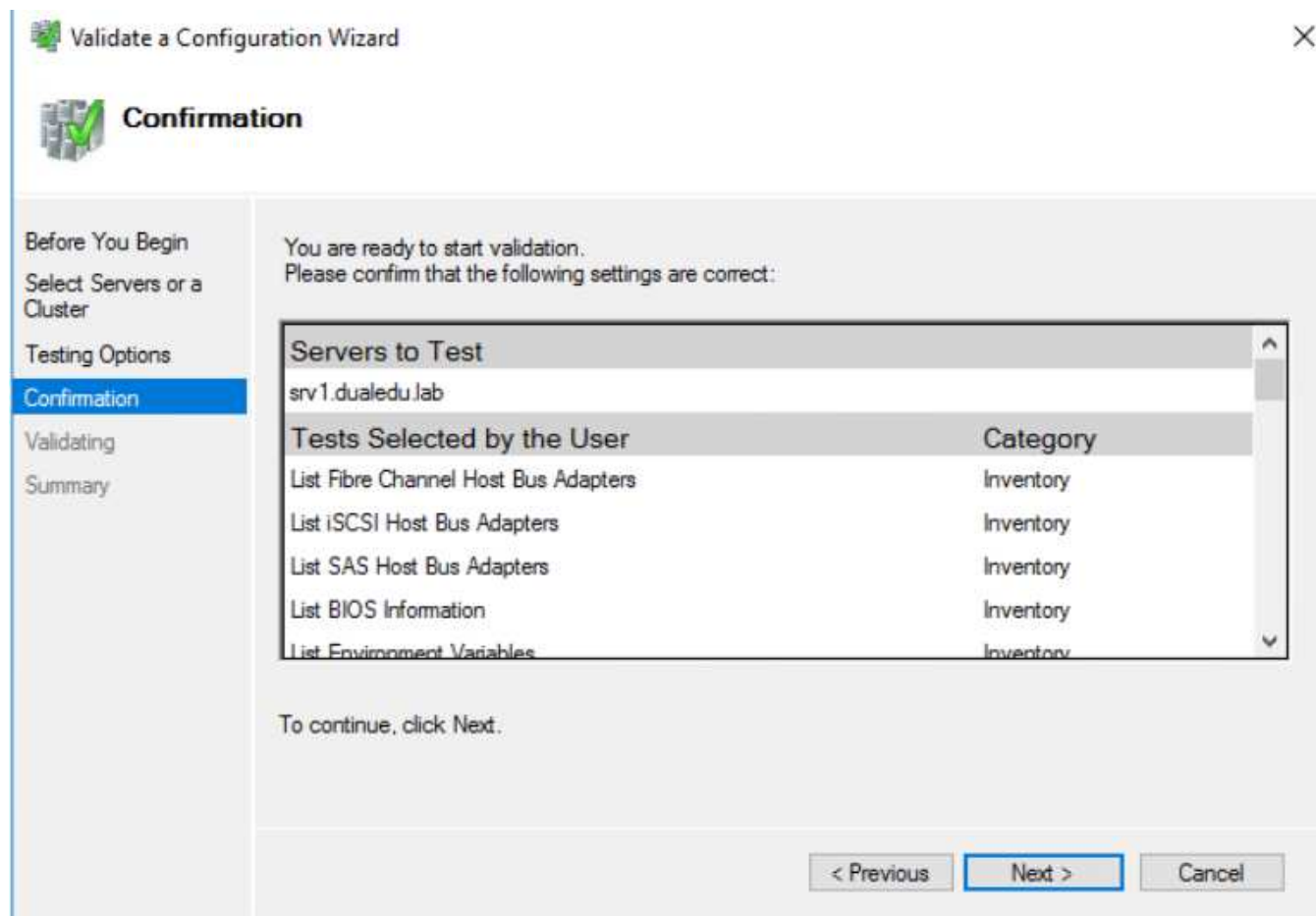
☒ Run all tests (recommended)
☐ Run only tests I select

[More about cluster validation tests](#)

< Previous **Next >** Cancel

Validation wizard

::8. Run validation wizard cez Falover cluster manager mmc



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
srv1.dualedu.lab

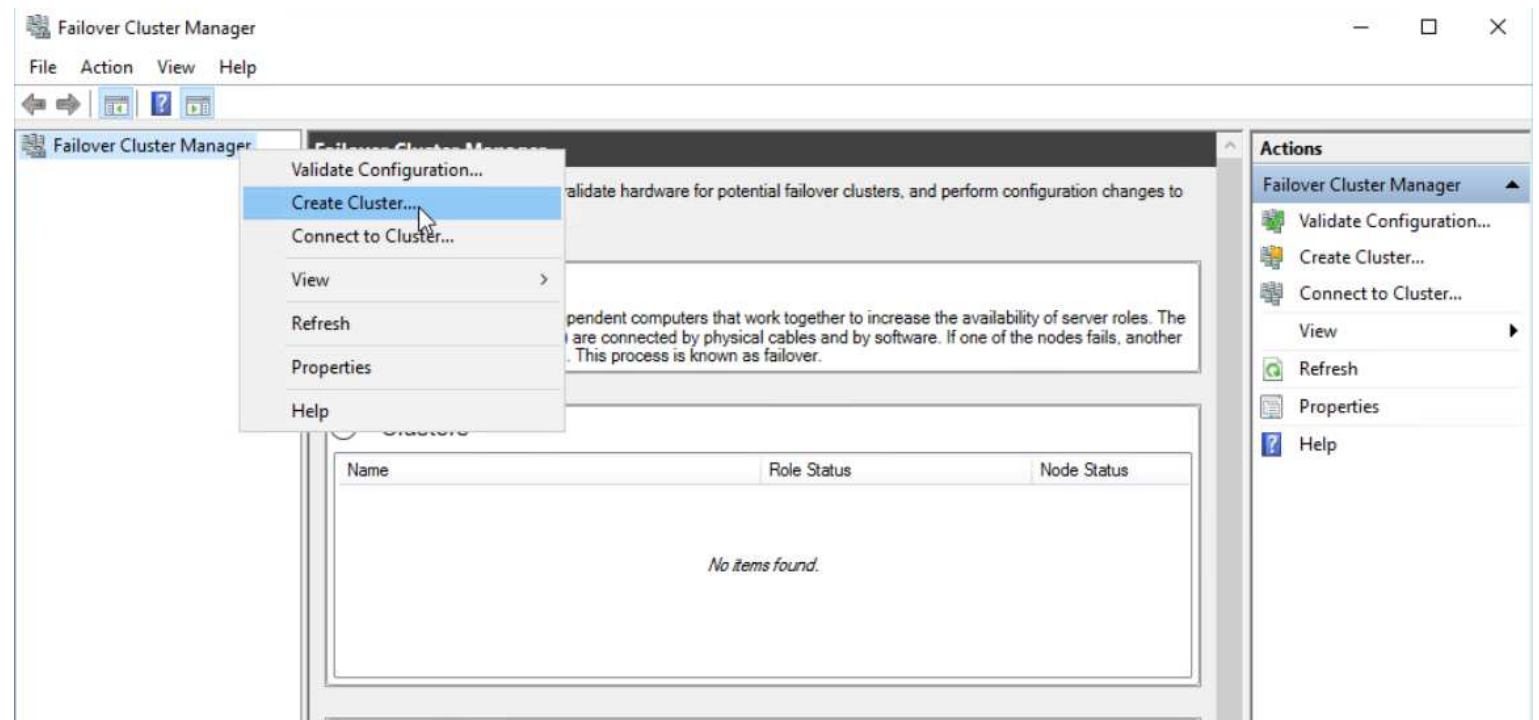
Tests Selected by the User	Category
List Fibre Channel Host Bus Adapters	Inventory
List iSCSI Host Bus Adapters	Inventory
List SAS Host Bus Adapters	Inventory
List BIOS Information	Inventory
List Environment Variables	Inventory

To continue, click Next.

< Previous **Next >** Cancel

Vytvorenie MS FC

::9. Spustenie Cluster creation wizard z failover cluster mmc



Vytvorenie MS FC

::9. Spustenie Cluster creation wizard z failover cluster mmc

The screenshot shows the 'Create Cluster Wizard' window, specifically the 'Select Servers' step. The window title is 'Create Cluster Wizard'. The left sidebar contains the following steps: 'Before You Begin', 'Select Servers' (highlighted), 'Validation Warning', 'Access Point for Administering the Cluster', 'Confirmation', 'Creating New Cluster', and 'Summary'. The main area has a heading 'Select Servers' and a sub-heading 'Add the names of all the servers that you want to have in the cluster. You must add at least one server.' Below this, there is a text input field labeled 'Enter server name:' containing 'srv2'. To the right of this field are three buttons: 'Browse...', 'Add', and 'Remove'. Below the input field is a list box labeled 'Selected servers:' containing 'srv1.dualedu.lab'. At the bottom of the window are three buttons: '< Previous', 'Next >' (highlighted), and 'Cancel'.

Create Cluster Wizard

Select Servers

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

Add the names of all the servers that you want to have in the cluster. You must add at least one server.

Enter server name:

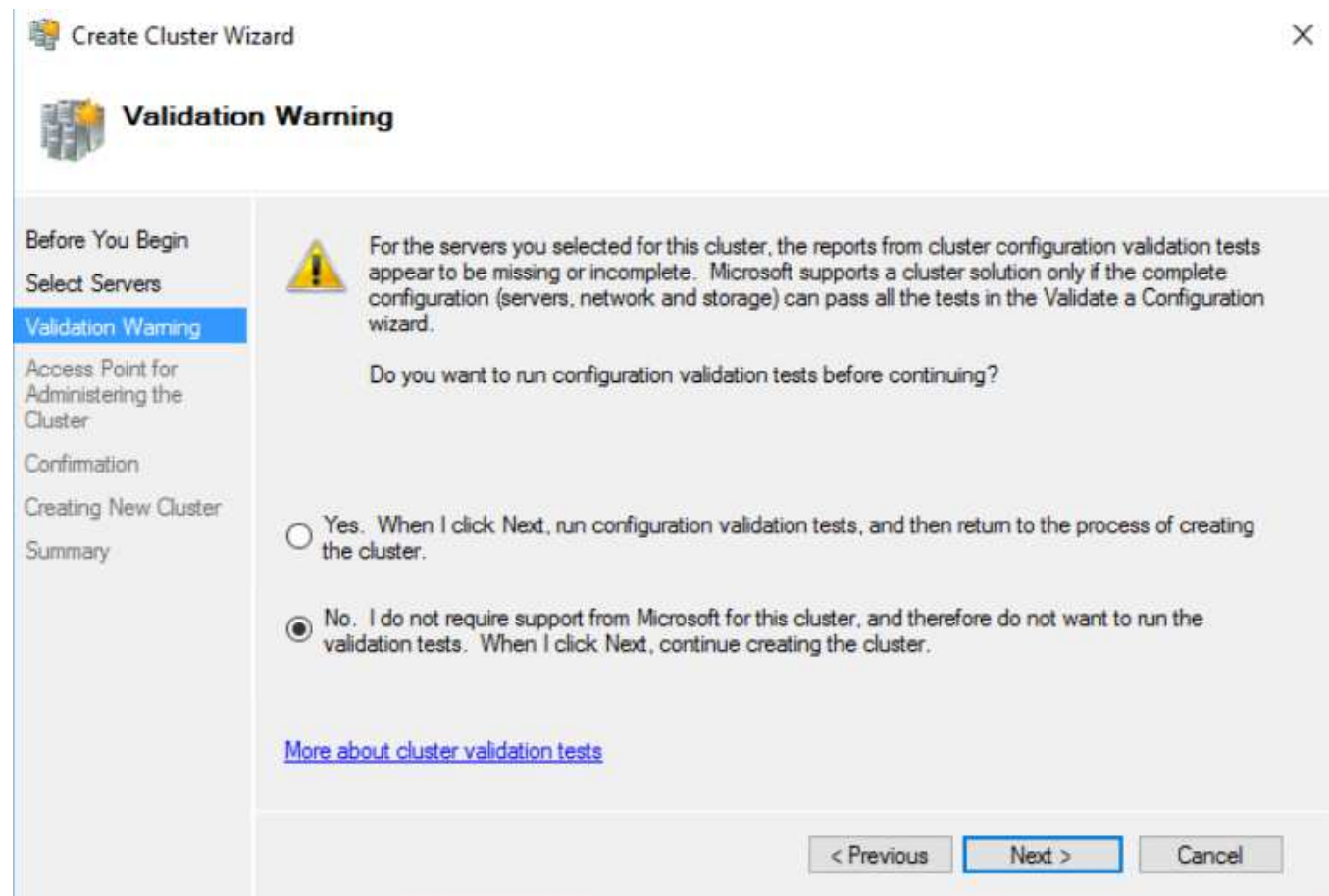
Selected servers:

Browse...
Add
Remove

< Previous Next > Cancel

Vytvorenie MS FC

::9. Spustenie Cluster creation wizard z failover cluster mmc



Vytvorenie MS FC

::9. Spustenie Cluster creation wizard z failover cluster mmc

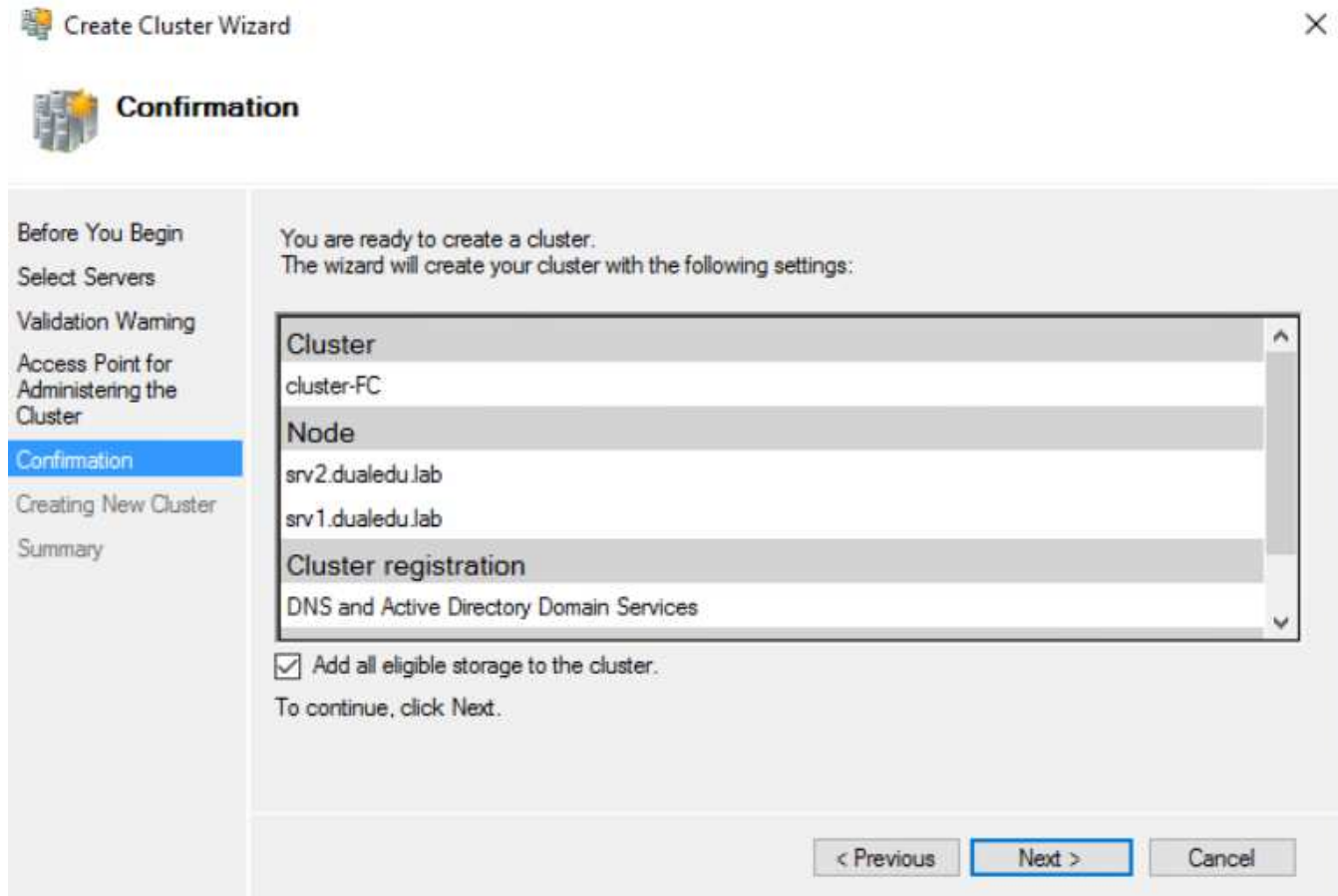
The screenshot shows the 'Create Cluster Wizard' window, specifically the 'Access Point for Administering the Cluster' step. The left sidebar contains a list of steps: 'Before You Begin', 'Select Servers', 'Validation Warning', 'Access Point for Administering the Cluster' (highlighted), 'Confirmation', 'Creating New Cluster', and 'Summary'. The main area prompts the user to 'Type the name you want to use when administering the cluster.' with a text box containing 'cluster-FC'. Below this, an information icon and text state: '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.' A table below lists the selected network and its address.

	Networks	Address
<input checked="" type="checkbox"/>	192.168.100.0/24	192 . 168 . 100 . 100

At the bottom right, there are three buttons: '< Previous', 'Next >' (highlighted), and 'Cancel'.

Vytvorenie MS FC

::9. Spustenie Cluster creation wizard z failover cluster mmc



The screenshot shows the 'Create Cluster Wizard' window, specifically the 'Confirmation' step. The window title is 'Create Cluster Wizard'. The left sidebar contains the following steps: 'Before You Begin', 'Select Servers', 'Validation Warning', 'Access Point for Administering the Cluster', 'Confirmation' (highlighted in blue), 'Creating New Cluster', and 'Summary'. The main area displays the following text: 'You are ready to create a cluster. The wizard will create your cluster with the following settings:'. Below this text is a list box containing the following settings: 'Cluster' (cluster-FC), 'Node' (srv2.dualedu.lab, srv1.dualedu.lab), and 'Cluster registration' (DNS and Active Directory Domain Services). At the bottom of the list box, there is a checkbox labeled 'Add all eligible storage to the cluster.' which is checked. Below the list box, the text 'To continue, click Next.' is displayed. At the bottom right of the window, there are three buttons: '< Previous', 'Next >' (highlighted with a blue border), and 'Cancel'.

Create Cluster Wizard

Confirmation

Before You Begin
Select Servers
Validation Warning
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:

Setting
Cluster
cluster-FC
Node
srv2.dualedu.lab
srv1.dualedu.lab
Cluster registration
DNS and Active Directory Domain Services

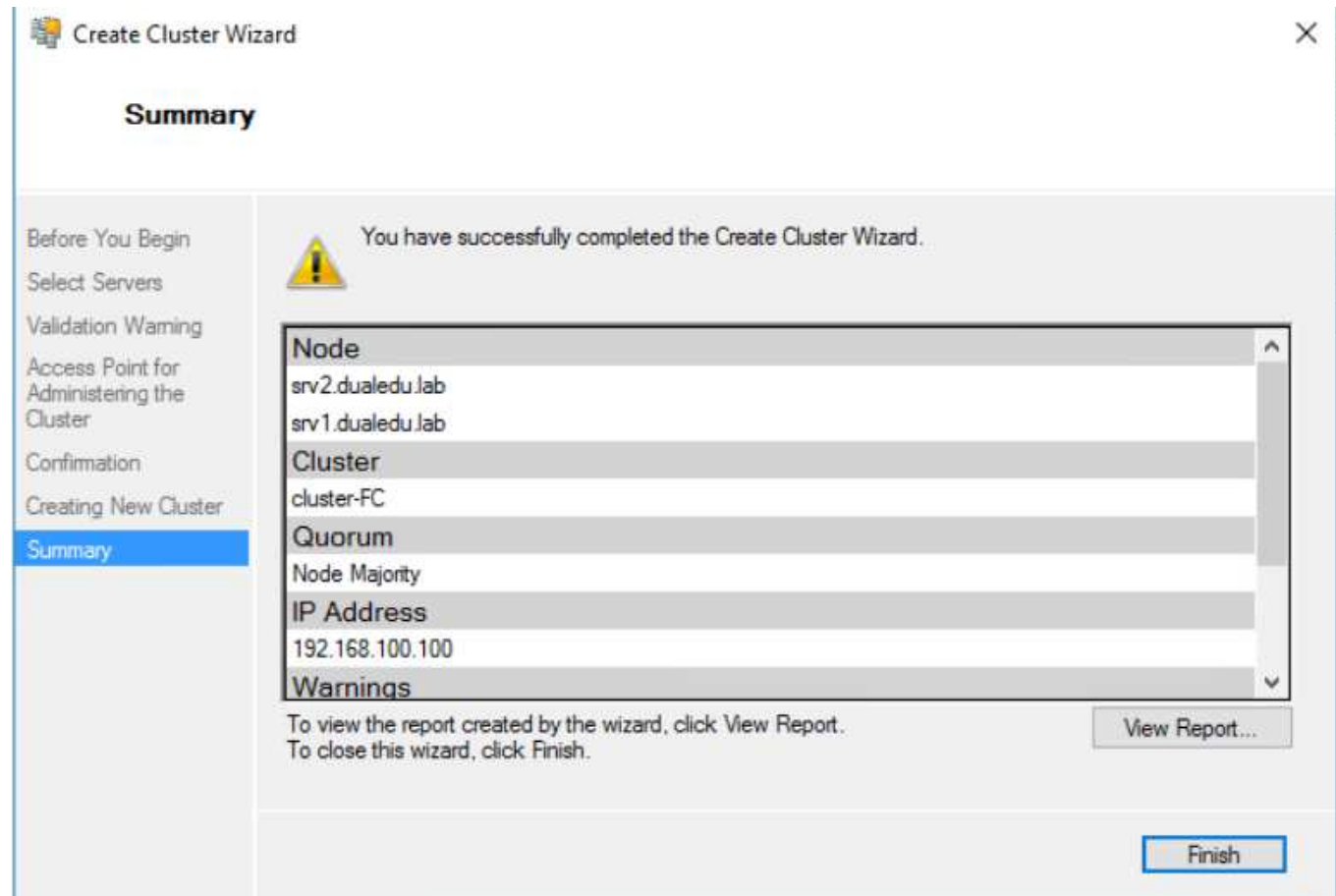
☒ Add all eligible storage to the cluster.

To continue, click Next.

< Previous Next > Cancel

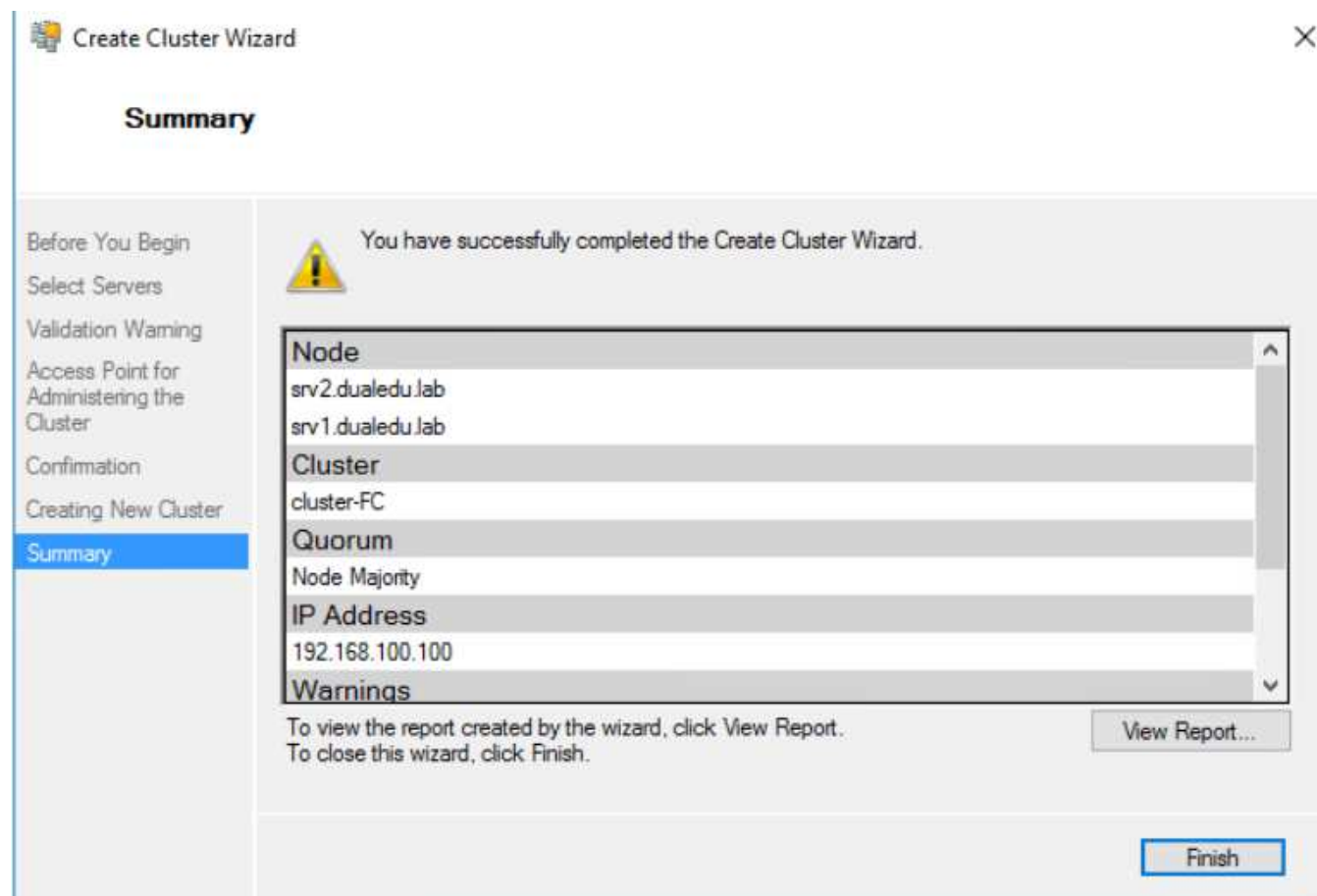
Vytvorenie MS FC

::9. Spustenie Cluster creation wizard z failover cluster mmc



Validácia konfigurácie #2

Spustenie View Report po dokončení wizarďa – bez chýb !



Validácia vytvorenie MS FC

Validácia nodov a Storage časti vo Failover cluster manager mmc

Failover Cluster Manager

File Action View Help

Failover Cluster Manager

cluster-FC.dualedu.lab

- Roles
- Nodes**
- Storage
- Disks
- Pools
- Enclosures
- Networks
- Cluster Events

Nodes (2)

Search

Name	Status	Assigned Vote	Current Vote	Site
srv1	Up	1	1	
srv2	Up	1	0	

Failover Cluster Manager

File Action View Help

Failover Cluster Manager

cluster1.dualedu.lab

- Roles
- Nodes
- Storage**
- Disks**
- Pools
- Enclosures
- Networks

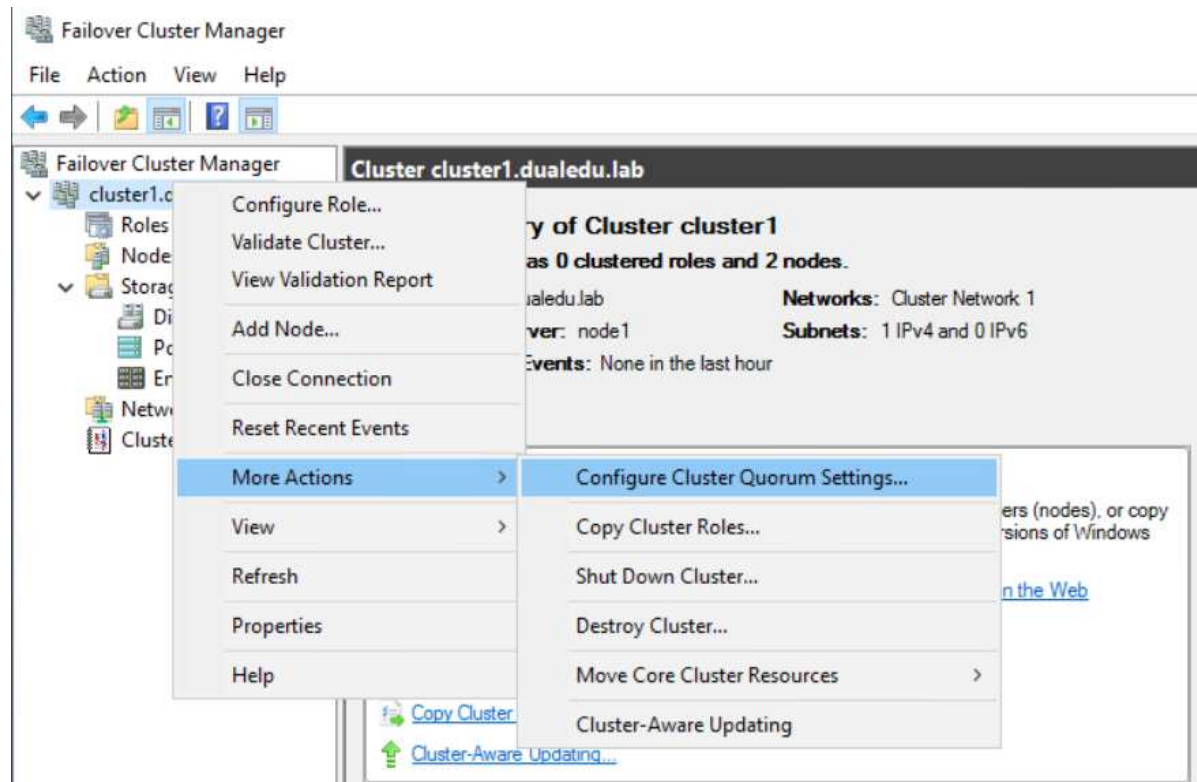
Disks (2)

Search

Name	Status	Assigned To	Owner Node
Cluster Disk 1	Online	Available Storage	node1
Cluster Disk 2	Online	Available Storage	node1

Witness cluster settings

:: 10. Konfiguracia voting z failover cluster mmc



Validate Witness cluster settings

:: 10. Konfiguracia voting z failover cluster mmc

Configure Cluster	Configure Cluster	Configure Cluster	Configure Cluster Quorum Wizard
Select Quorum Configuration Option	Select Quorum Configuration Option	Select Voting Configuration	Select Quorum Witness
Before You Begin	Before You Begin	Before You Begin	Before You Begin
Select Quorum Configuration Option	Select Quorum Configuration Option	Select Quorum Configuration Option	Select Quorum Configuration Option
Confirmation	Select Voting Configuration	Select Voting Configuration	Select Voting Configuration
Configure Cluster Quorum Settings	Select Quorum Witness	Select Quorum Witness	Select Quorum Witness
Summary	Confirmation	Confirmation	Confirmation
	Configure Cluster Quorum Settings	Configure Cluster Quorum Settings	Configure Cluster Quorum Settings
	Summary	Summary	Summary

Select a quorum witness option to add or change the quorum witness for your cluster. As a best practice, configure a quorum witness to help achieve the highest availability of the cluster.

☐ Configure a disk witness
Adds a quorum vote of the disk witness

☐ Configure a file share witness
Adds a quorum vote of the file share witness

☐ Configure a cloud witness
Adds a quorum vote of the cloud witness

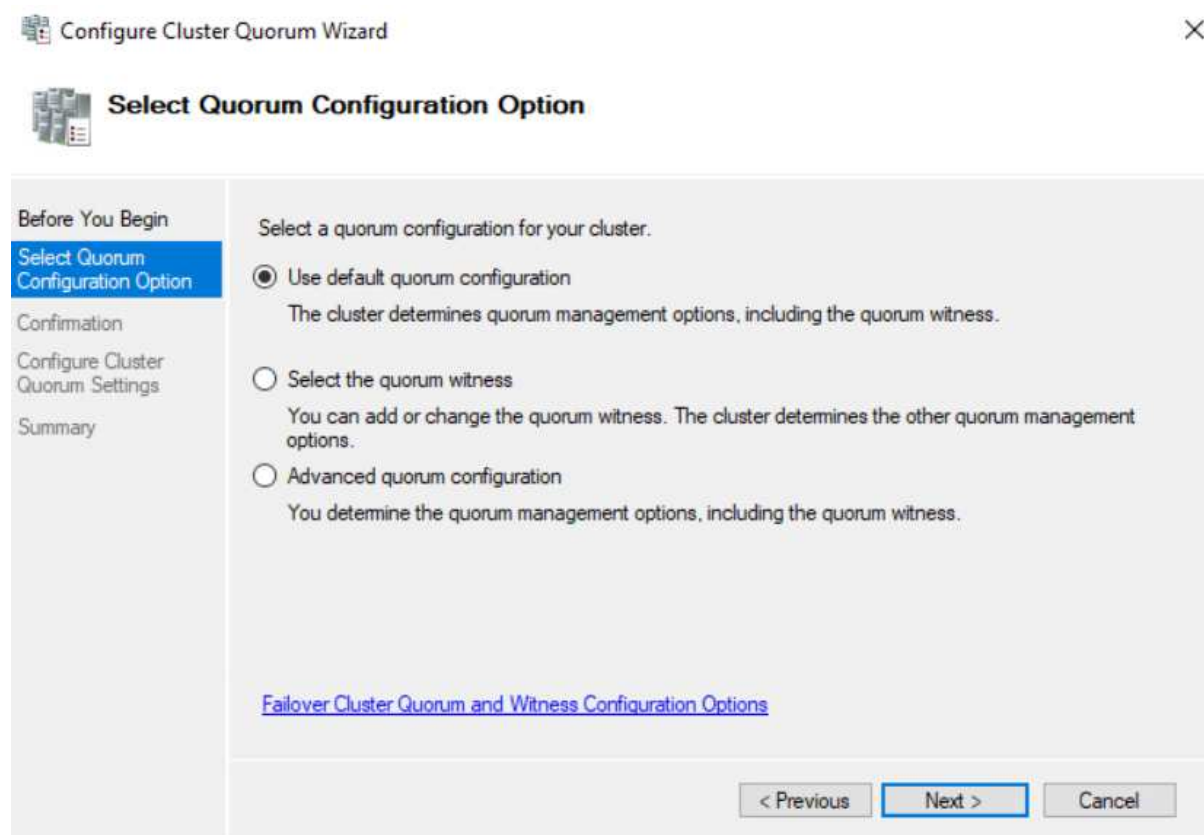
☒ Do not configure a quorum witness

[Failover Cluster Quorum and Witness Configuration Options](#)

< Previous Next >

Validate Witness cluster settings

:: 10. Konfiguracia voting z failover cluster mmc



The screenshot shows the 'Configure Cluster Quorum Wizard' window. The title bar reads 'Configure Cluster Quorum Wizard'. Below the title bar, there is a section titled 'Select Quorum Configuration Option'. On the left side, there is a navigation pane with the following steps: 'Before You Begin', 'Select Quorum Configuration Option' (which is currently selected and highlighted in blue), 'Confirmation', 'Configure Cluster Quorum Settings', and 'Summary'. The main area of the wizard contains the following text: 'Select a quorum configuration for your cluster.' followed by three radio button options: 1. 'Use default quorum configuration' (selected): 'The cluster determines quorum management options, including the quorum witness.' 2. 'Select the quorum witness': 'You can add or change the quorum witness. The cluster determines the other quorum management options.' 3. 'Advanced quorum configuration': 'You determine the quorum management options, including the quorum witness.' At the bottom of the main area, there is a blue hyperlink: 'Failover Cluster Quorum and Witness Configuration Options'. At the bottom right of the window, there are three buttons: '< Previous', 'Next >' (which is highlighted with a blue border), and 'Cancel'.

Configure Cluster Quorum Wizard

Select Quorum Configuration Option

Before You Begin
Select Quorum Configuration Option
Confirmation
Configure Cluster Quorum Settings
Summary

Select a quorum configuration for your cluster.

- ☒ Use default quorum configuration
The cluster determines quorum management options, including the quorum witness.
- ☐ Select the quorum witness
You can add or change the quorum witness. The cluster determines the other quorum management options.
- ☐ Advanced quorum configuration
You determine the quorum management options, including the quorum witness.

[Failover Cluster Quorum and Witness Configuration Options](#)

< Previous **Next >** Cancel

Validate Witness cluster settings

:: 10. Konfiguracia voting z failover cluster mmc

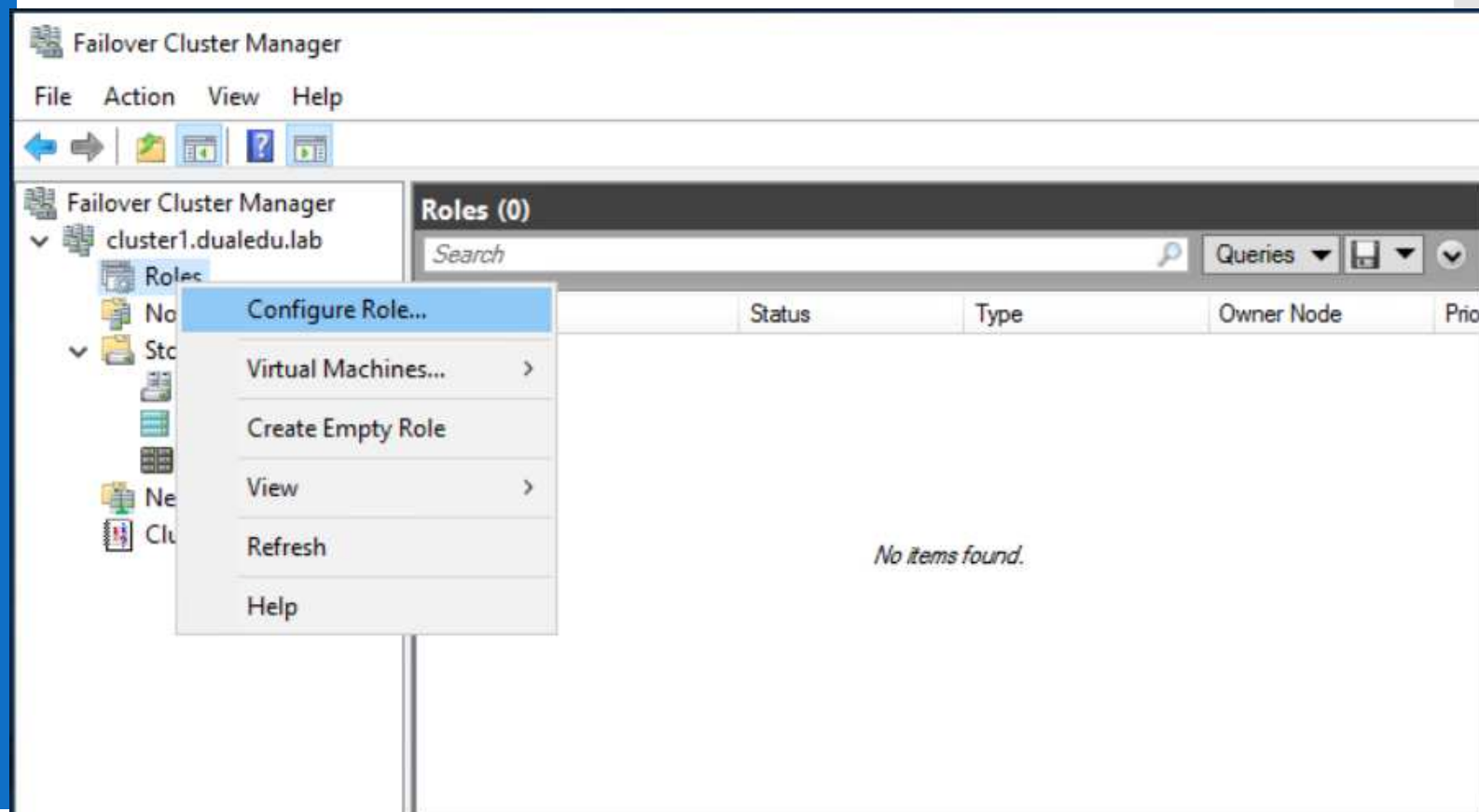
The screenshot shows the 'Configure Cluster Quorum Wizard' window, specifically the 'Confirmation' step. The window title is 'Configure Cluster Quorum Wizard'. The left sidebar contains the following steps: 'Before You Begin', 'Select Quorum Configuration Option', 'Confirmation' (which is highlighted), 'Configure Cluster Quorum Settings', and 'Summary'. The main area of the wizard displays the text 'You are ready to configure the quorum settings of the cluster.' Below this text is a box titled 'Configure Cluster Quorum Settings' which contains the following configuration details:

Configure Cluster Quorum Settings	
Disk Witness	Cluster Disk 1
Cluster Managed Voting	Enabled
Voting Nodes:	
All nodes are configured to have quorum votes	

Below the configuration box, the text 'To continue, click Next.' is displayed. At the bottom right of the wizard, there are three buttons: '< Previous', 'Next >' (which is highlighted with a blue border), and 'Cancel'.

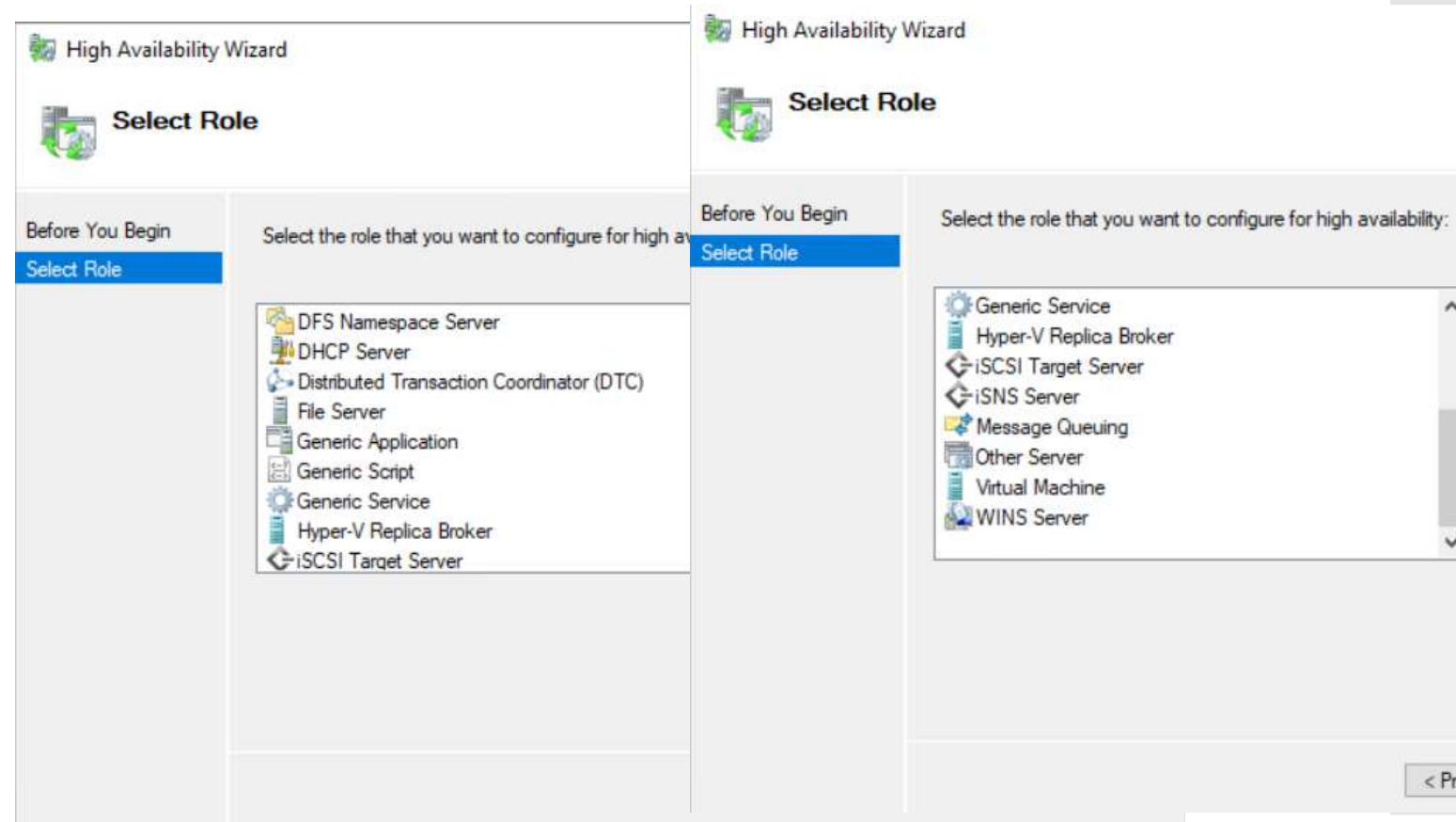
Pridanie clustered role

:: 11. Konfiguracia clustered role



Pridanie clustered role

:: 11. Konfiguracia clustered role



Pridanie clustered role

:: 11. Konfiguracia clustered role – inštalovanie File services na
vsetky nody

```
Administrator: Windows PowerShell

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

PS C:\Users\administrator.DUALEDU> Get-WindowsFeature -Name *file*

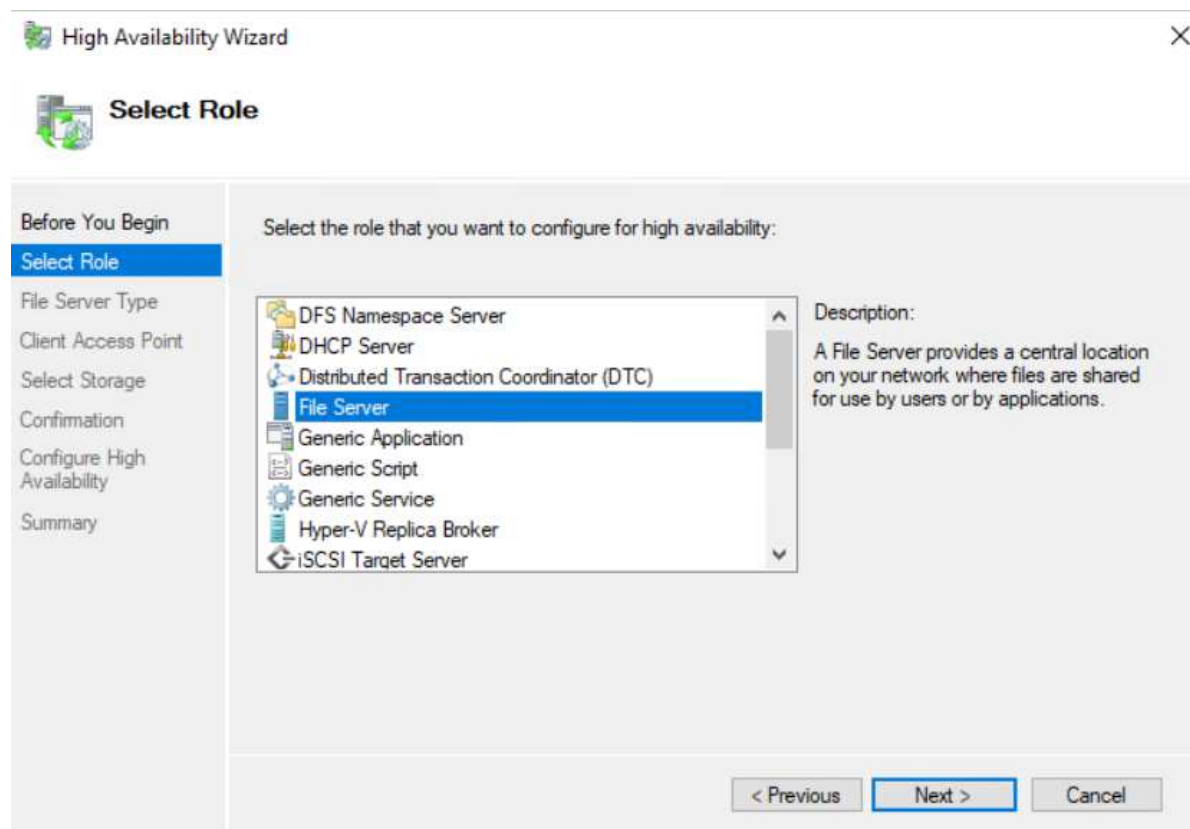
Display Name                                Name                                Install State
-----
[X] File and Storage Services               FileAndStorage-Services           Installed
[ ] File and iSCSI Services                 File-Services                     Available
[ ] File Server                             FS-FileServer                     Available
[ ] File Services Tools                     RSAT-File-Services                Available

PS C:\Users\administrator.DUALEDU> Install-WindowsFeature -Name FS-FileServer -IncludeManagementTools -Computer SRV1

PS C:\Users\administrator.DUALEDU> Install-WindowsFeature -Name FS-FileServer -IncludeManagementTools -Computer SRV2
```

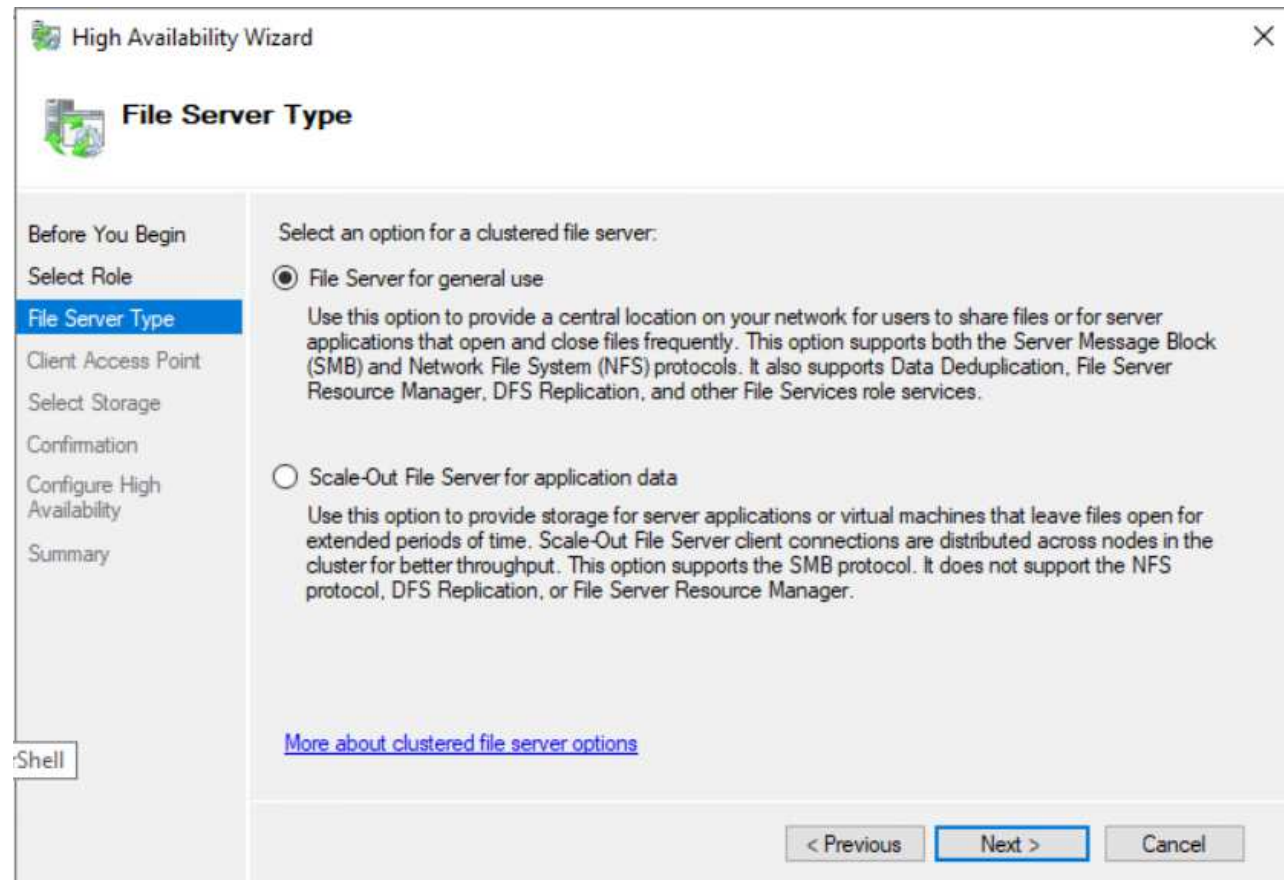
Pridanie clustered role

:: 11. Konfiguracia clustered role – inštalovanie File services na
vsetky nody



Pridanie clustered role

:: 11. Konfiguracia clustered role – inštalovanie File services na
všetky nody



Pridanie clustered role

:: 11. Konfiguracia clustered role – inštalovanie File services na
vsetky nody

High Availability Wizard

Client Access Point

Before You Begin
Select Role
File Server Type
Client Access Point
Select Storage
Confirmation
Configure High Availability
Summary

Type the name that clients will use when accessing this clustered role:

Name:

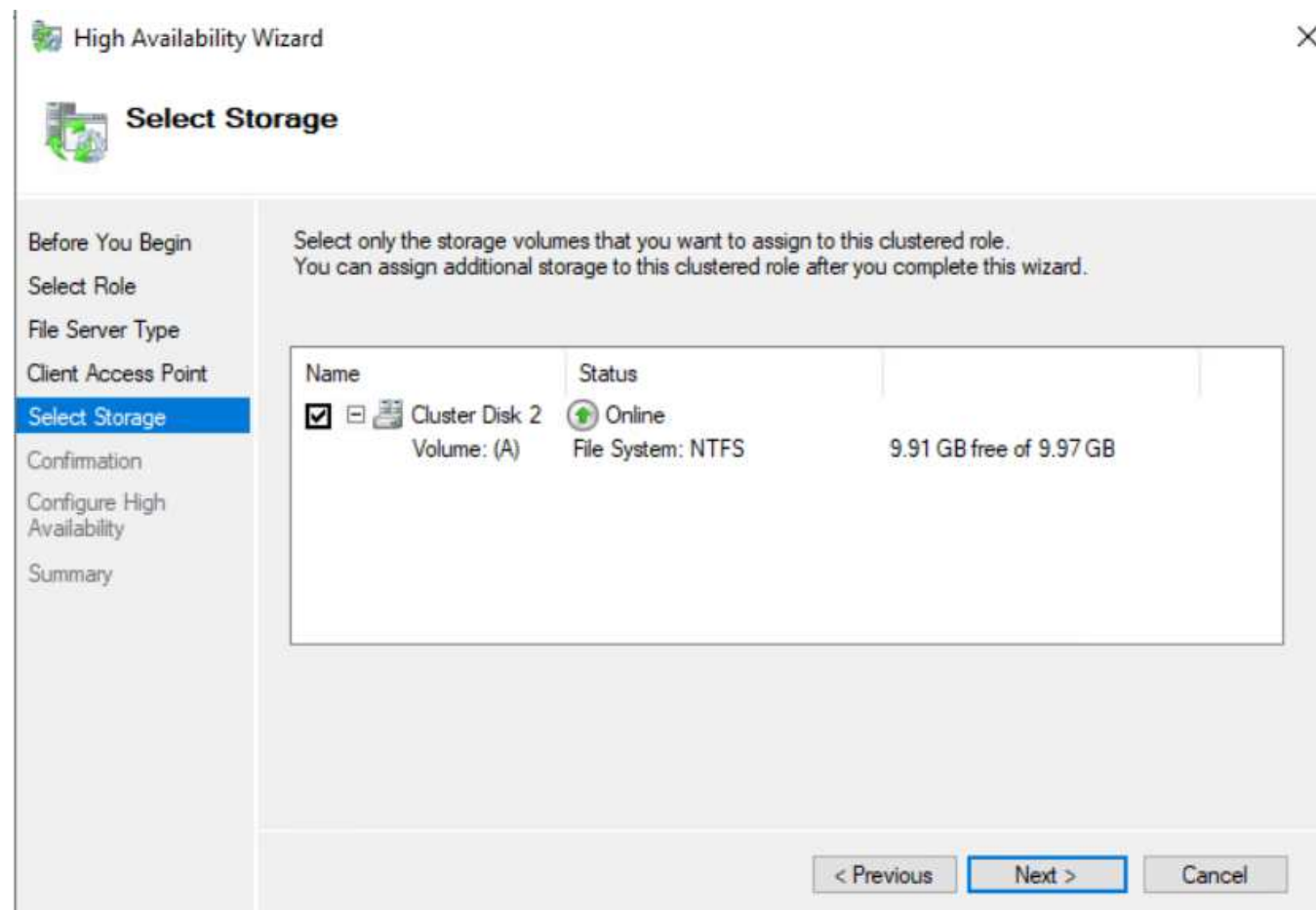
The NetBIOS name is limited to 15 characters. One or more IPv4 addresses could not be configured automatically. For each network to be used, make sure the network is selected, and then type an address.

	Networks	Address
<input checked="" type="checkbox"/>	192.168.100.0/24	192.168.100.101

< Previous **Next >** Cancel

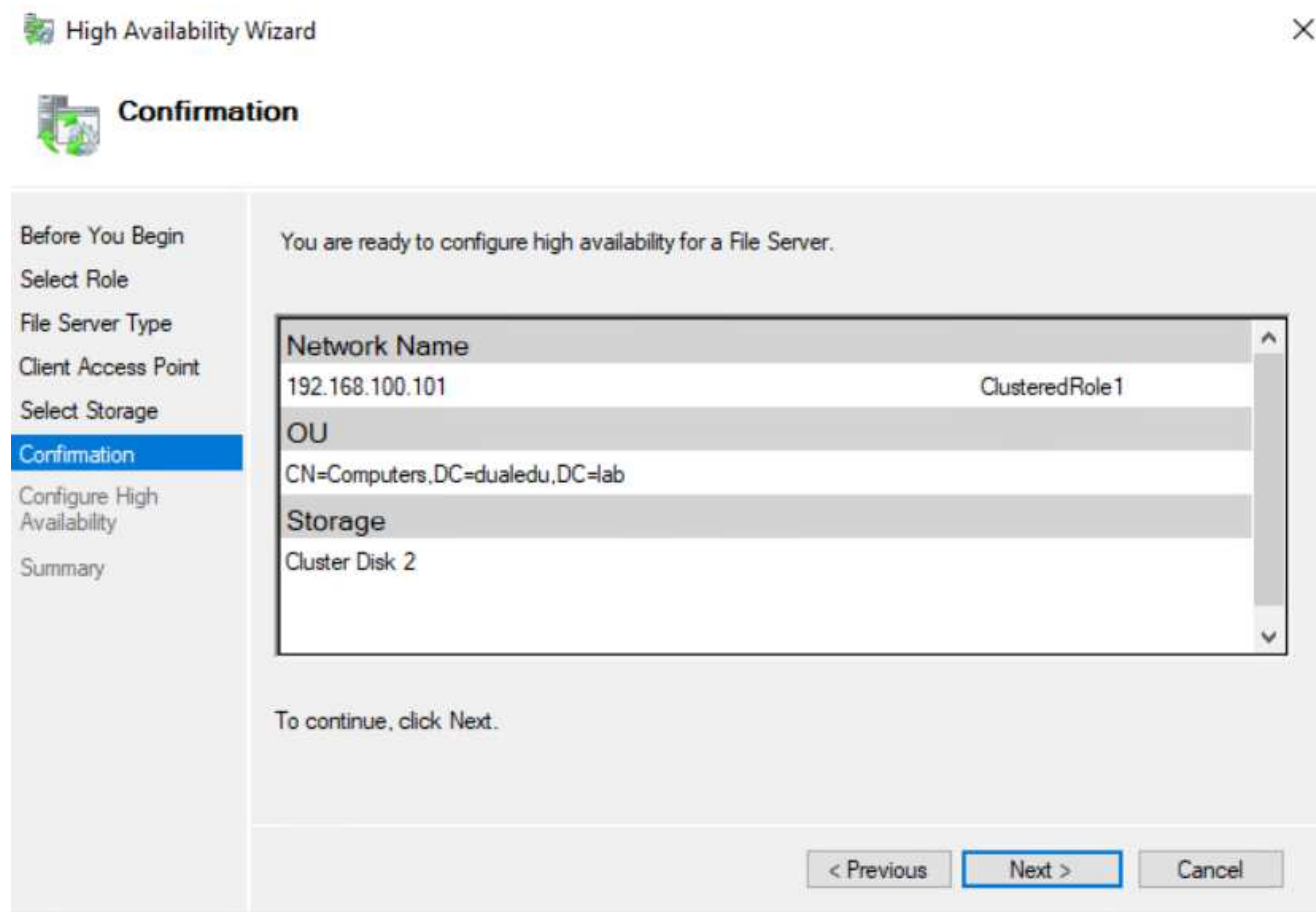
Pridanie clustered role

:: 11. Konfiguracia clustered role – inštalovanie File services na
všetky nody



Pridanie clustered role

:: 11. Konfiguracia clustered role – inštalovanie File services na vsetky nody

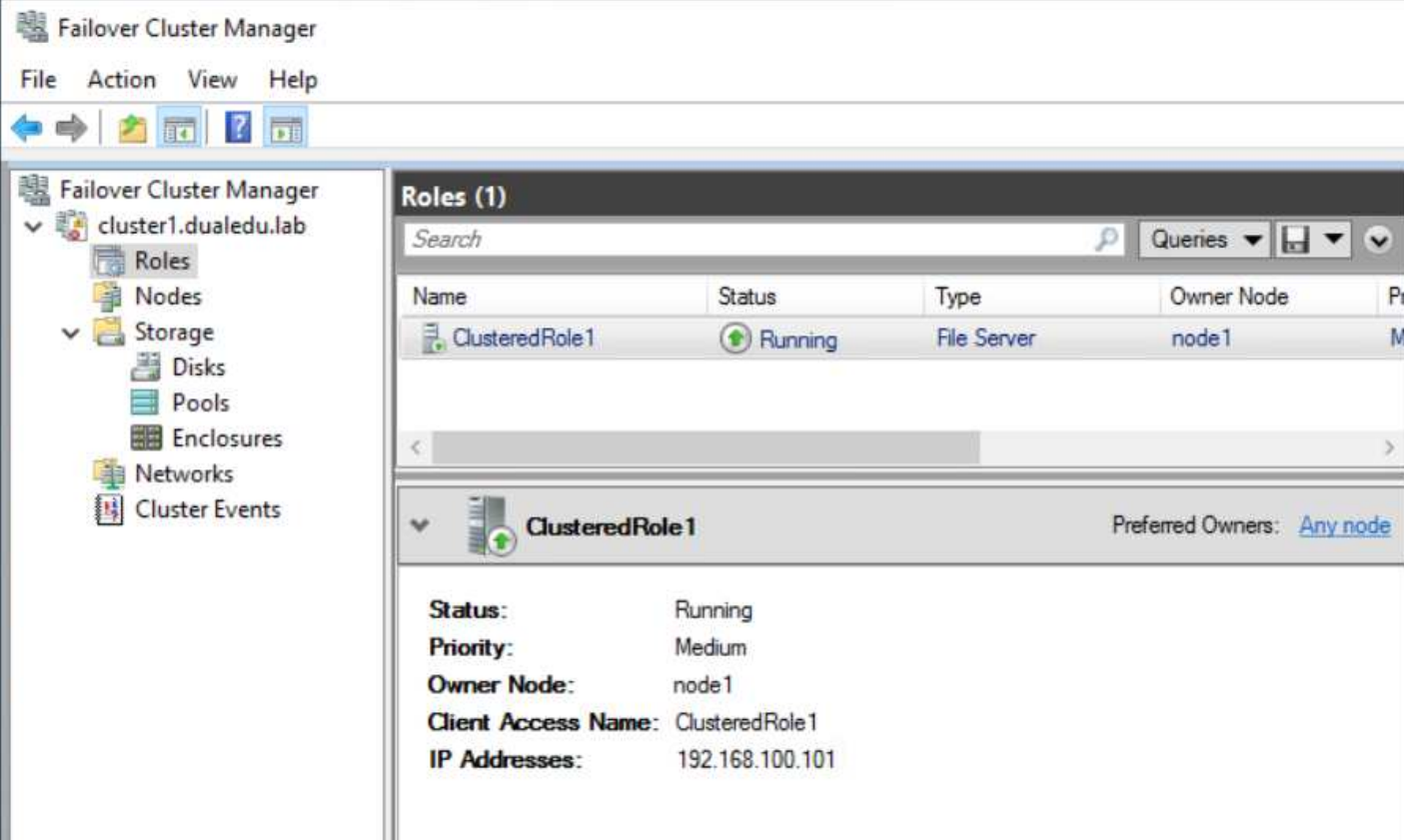


The image shows the 'High Availability Wizard' window, specifically the 'Confirmation' step. The window title is 'High Availability Wizard'. The left sidebar contains the following steps: 'Before You Begin', 'Select Role', 'File Server Type', 'Client Access Point', 'Select Storage', 'Confirmation' (highlighted in blue), 'Configure High Availability', and 'Summary'. The main area displays the text: 'You are ready to configure high availability for a File Server.' Below this is a table with three rows: 'Network Name' with values '192.168.100.101' and 'ClusteredRole1'; 'OU' with value 'CN=Computers,DC=dualedu,DC=lab'; and 'Storage' with value 'Cluster Disk 2'. At the bottom, it says 'To continue, click Next.' and there are three buttons: '< Previous', 'Next >' (highlighted with a blue border), and 'Cancel'.

Property	Value
Network Name	192.168.100.101
	ClusteredRole1
OU	CN=Computers,DC=dualedu,DC=lab
Storage	Cluster Disk 2

Validácia konfigurácia #3

Validacia, že resource je ONLINE



Failover Cluster Manager

File Action View Help

Failover Cluster Manager

- cluster1.duaedu.lab
 - Roles
 - Nodes
 - Storage
 - Disks
 - Pools
 - Enclosures
 - Networks
 - Cluster Events

Roles (1)

Name	Status	Type	Owner Node	Pr
ClusteredRole1	Running	File Server	node1	M

ClusteredRole1 Preferred Owners: [Any node](#)

Status: Running

Priority: Medium

Owner Node: node1

Client Access Name: ClusteredRole1

IP Addresses: 192.168.100.101

Validácia konfigurácie #3

Validacia, že resource je ONLINE

```
Administrator: Windows PowerShell
PS C:\Users\administrator.DUALEDU>
PS C:\Users\administrator.DUALEDU> Get-ClusterGroup

Name                OwnerNode State
-----
Available Storage  node1    Offline
Cluster Group      node1    Online
ClusteredRole1     node1    Online

PS C:\Users\administrator.DUALEDU>
```

```
PS C:\Users\administrator.DUALEDU> Get-ClusterResource

Name                State OwnerGroup ResourceType
-----
Cluster Disk 1      Online Cluster Group Physical Disk
Cluster Disk 2      Online ClusteredRole1 Physical Disk
Cluster IP Address  Online Cluster Group IP Address
Cluster Name        Online Cluster Group Network Name
ClusteredRole1      Online ClusteredRole1 Network Name
File Server (\\ClusteredRole1) Online ClusteredRole1 File Server
IP Address 192.168.100.101 Online ClusteredRole1 IP Address
```

Pridanie clustered role #2

- Opakovaním predchádzajúcich krokov pridaj ClusteredRole2
- Vytvore shared folder a vyskúšaj vysokú dostupnosť

Vráťanie do pôvodného stavu

- Destroy cluster
- Removal Failover cluster feature
- Cleanup DNS

NEXT

::Failover cluster

<https://docs.microsoft.com/en-us/windows-server/failover-clustering/failover-clustering-overview>

::Scale-Out File server

<https://docs.microsoft.com/en-us/windows-server/failover-clustering/sofs-overview>