IT 236 Project Report Form

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Date:	11/05/2025
Project Phase	Configuring Storage Replica for Data Resiliency

Section 1: Executive Summary (20 points)

This report presents the implementation and validation of Storage Replica between NV-FS1 and NV-DC1 as part of the ongoing NewVue Health Infrastructure Modernization Project. The goal of this phase was to ensure data resiliency, business continuity, and high availability across the network infrastructure.

Through the successful deployment of Storage Replica, the organization now maintains a continuously updated copy of departmental data hosted on NV-FS1. This redundancy minimizes downtime and protects critical files in the event of hardware or service failure. The configuration also established secure management communication between servers through WinRM over HTTPS, using self-signed certificates and mutual trust validation.

Verification steps confirmed healthy replication, switch-direction functionality, and read-only access to data during simulated source server failure.

Replication Configuration Summary

Server	Role	Data Volume	Log Volume	Replication Direction
NV-FS1	Source	NewVueData (E:\)	New Volume (F:\)	Send
NV-DC1	Destination	DC1_Data (E:\)	New Volume (F:\)	Receive

Scope of Work

The activity included:

- Installing and validating the Storage Replica feature on both NV-FS1 and NV-DC1.
- Preparing and configuring dedicated data (E:) and log (F:) volumes on both servers to host the replicated file shares and replication metadata.\
- Securing server management channels by configuring WinRM over HTTPS and establishing mutual certificate trust between NV-FS1 and NV-DC1.

- Deploying Windows Admin Center on NV-FS1 to provide a centralized management dashboard for the replication partnership.

- Creating and configuring a synchronous replication partnership, designating NV-FS1 as the source and NV-DC1 as the destination.

- Thoroughly monitoring replication health, validating data synchronization, and conducting a failure simulation to confirm business continuity processes, including switch-over and read-only access to the replicated data.

Section 2: Implementation and Verification Evidence

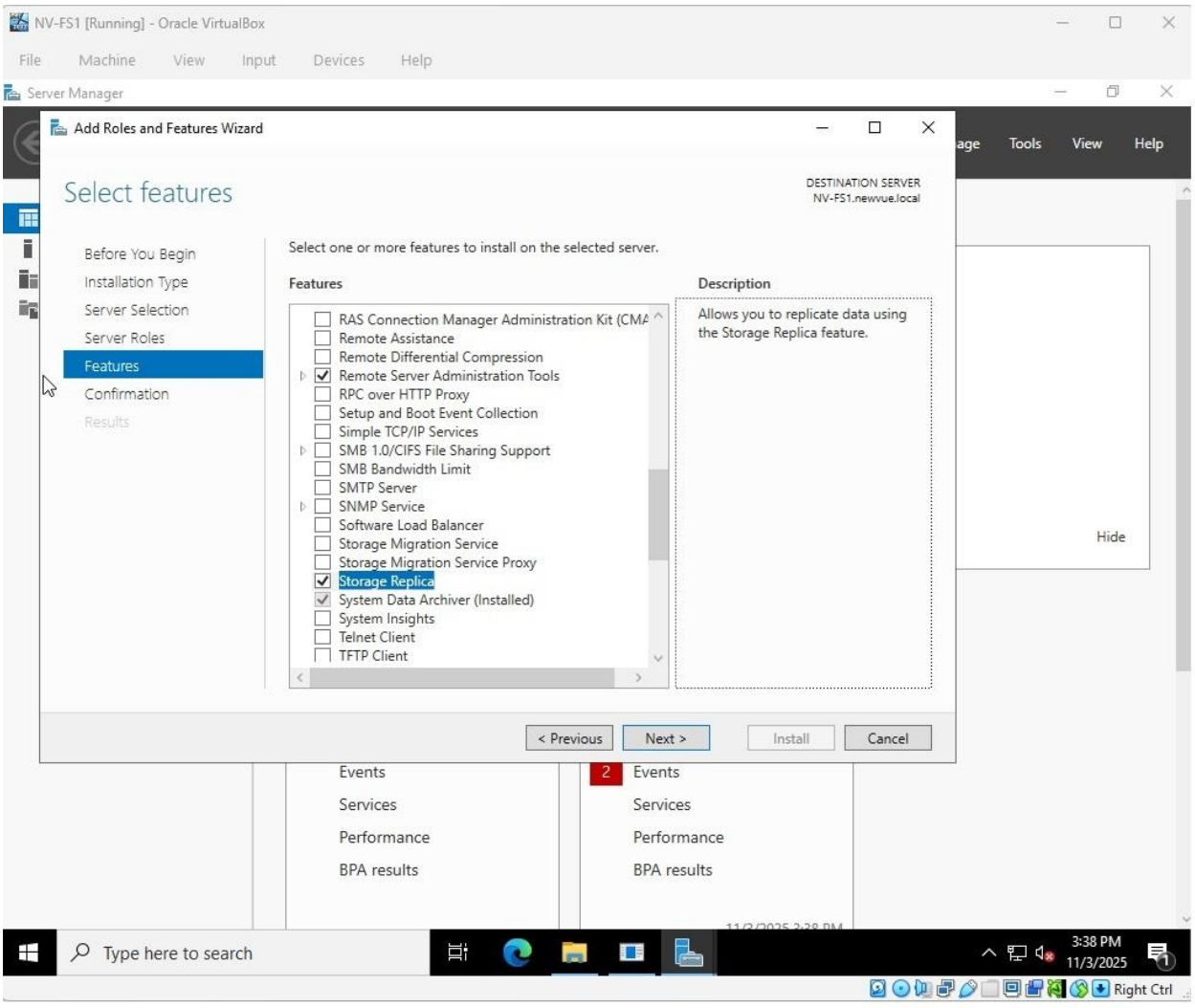
This section documents the technical steps carried out during the implementation of **Storage Replica** and the corresponding evidence that validates successful configuration. Each subsection outlines the task objectives, describes the specific focus of the implementation, and identifies the required screenshots or command outputs that confirm correct execution and functionality.

Task 1 – Install and Verify the Storage Replica Feature (20 pts)

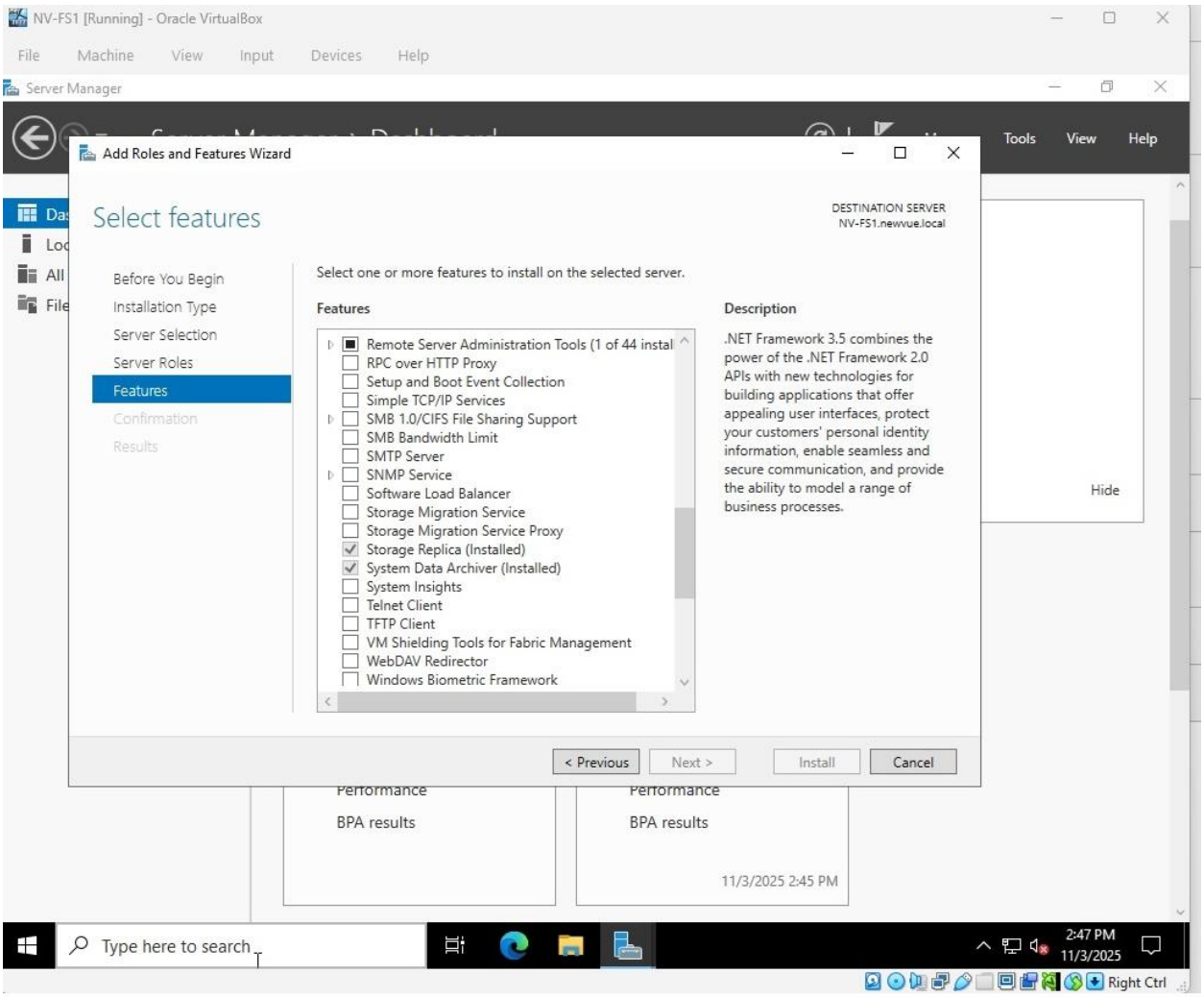
This task involved enabling the Storage Replica feature on both NV-FS1 and NV-DC1 to allow block-level replication and high-availability services. The installation was completed through Server Manager on both systems.

Evidence Requirements:

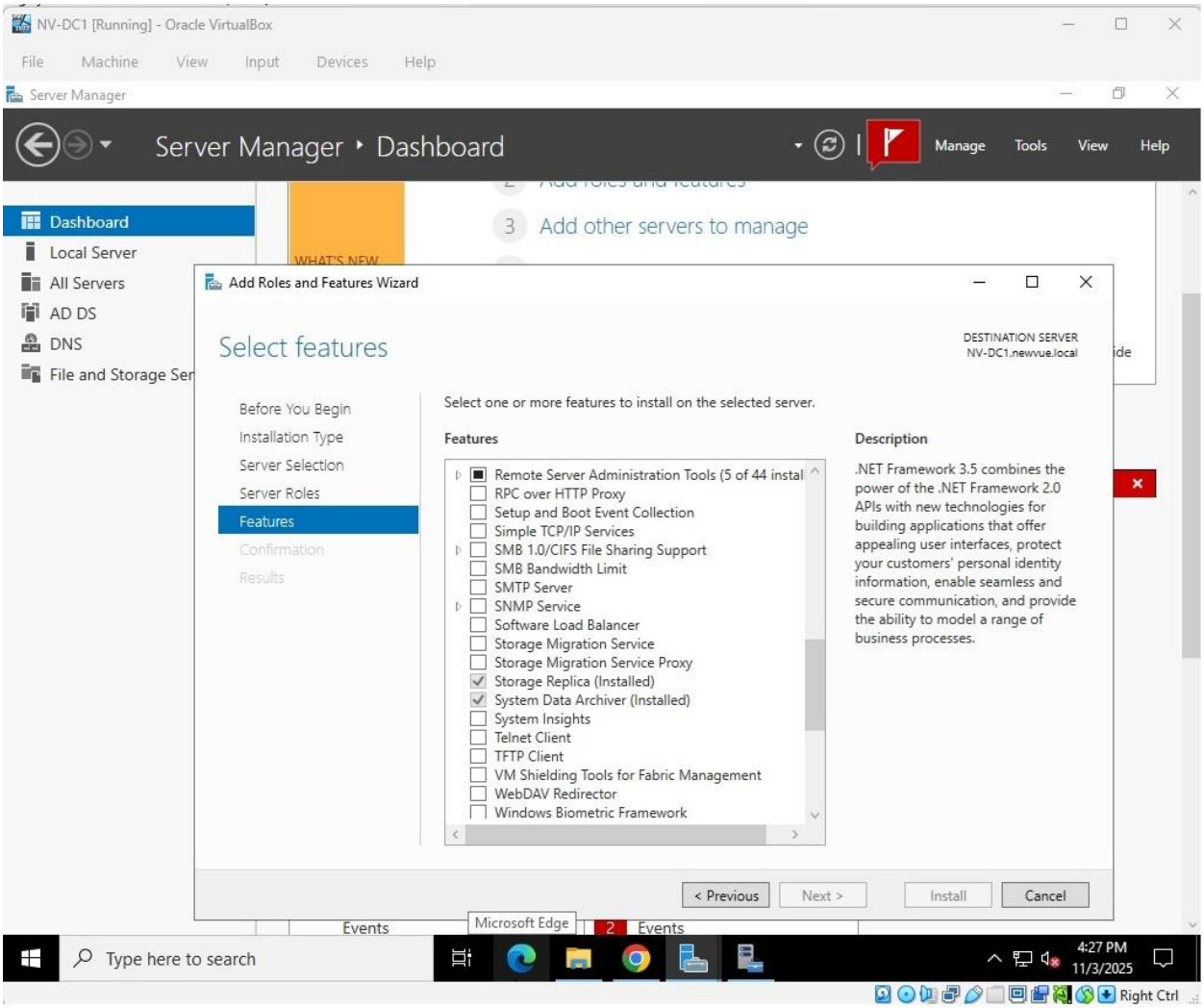
- **Evidence 1:** Storage Replica selected in Add Roles and Features wizard (NV-FS1).



- **Evidence 2:** Installation summary showing completion on NV-FS1.



- **Evidence 3:** Storage Replica listed under Installed Features on NV-DC1.

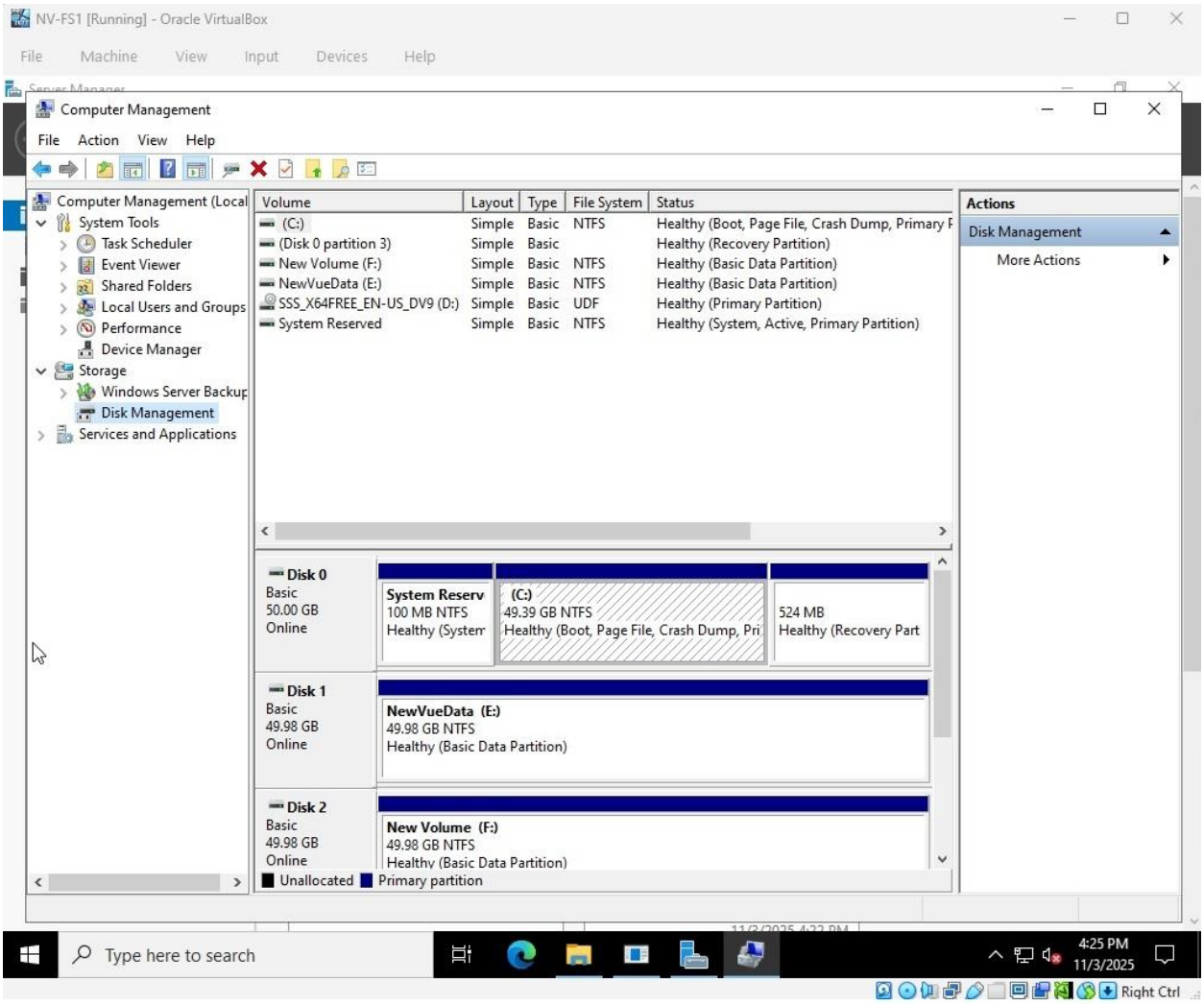


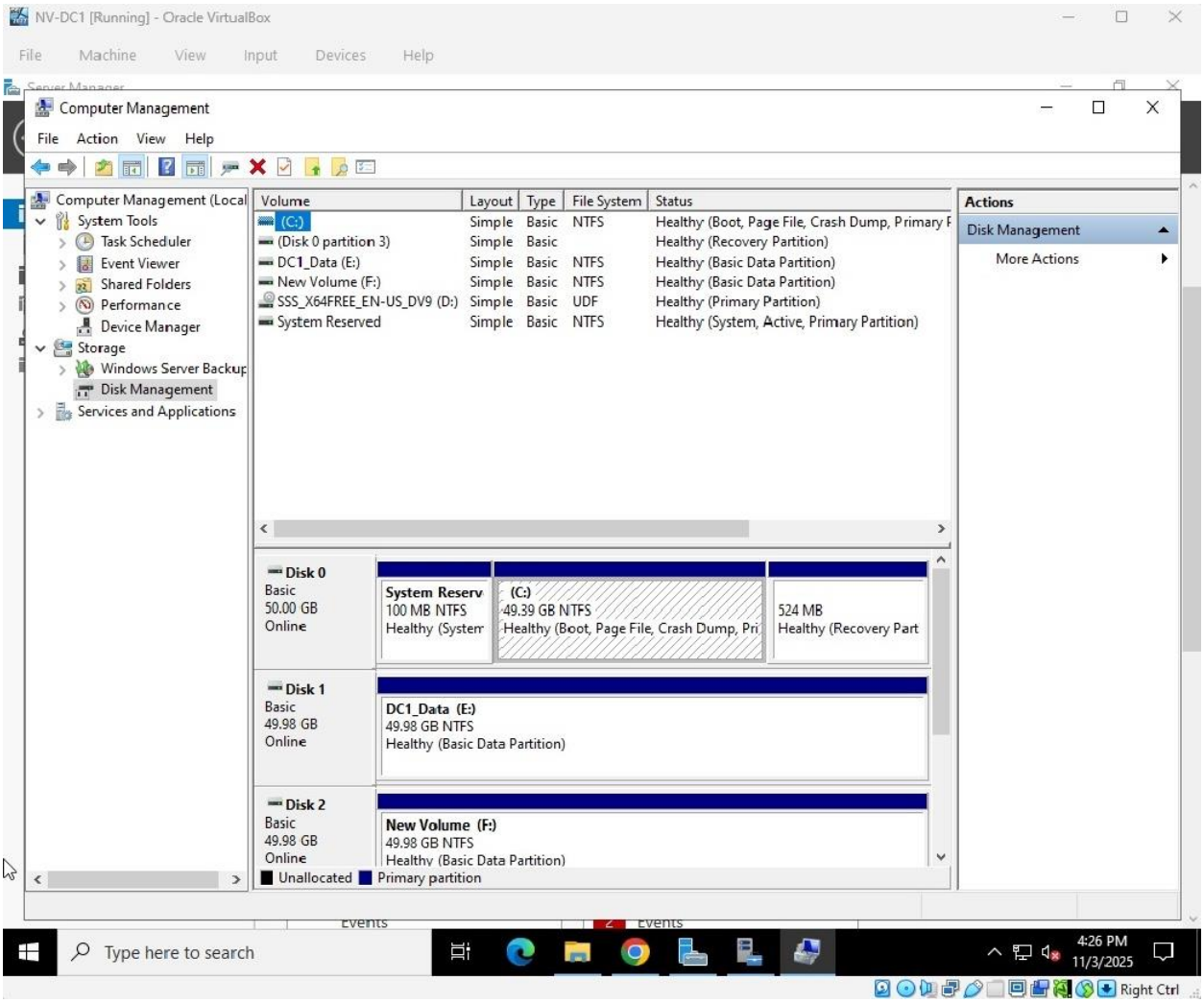
Task 2 – Prepare Volumes for Replication (10 pts)

In this section, additional virtual disks were attached and configured to serve as data and log volumes on both servers. Proper volume preparation is critical for efficient replication and log management.

Evidence Requirements:

- **Evidence 4:** Disk Management showing data and log volumes on both servers.




NV-DC1 [Running] - Oracle VirtualBox
File Machine View Input Devices Help
Computer Management
File Action View Help
Computer Management (Local
System Tools
Task Scheduler
Event Viewer
Shared Folders
Performance
Device Manager
Storage
Windows Server Backup
Disk Management
Services and Applications
Volume Layout Type File System Status
(C:) Simple Basic NTFS Healthy (Boot, Page File, Crash Dump, Primary P
(Disk 0 partition 3) Simple Basic Healthy (Recovery Partition)
DC1_Data (E:) Simple Basic NTFS Healthy (Basic Data Partition)
New Volume (F:) Simple Basic NTFS Healthy (Basic Data Partition)
SSS_X64FREE_EN-US_DV9 (D:) Simple Basic UDF Healthy (Primary Partition)
System Reserved Simple Basic NTFS Healthy (System, Active, Primary Partition)
Actions
Disk Management
More Actions
Disk 0
Basic
50.00 GB
Online
System Reserv
100 MB NTFS
Healthy (Syster
(C:)
49.39 GB NTFS
Healthy (Boot, Page File, Crash Dump, Pri
524 MB
Healthy (Recovery Part
Disk 1
Basic
49.98 GB
Online
DC1_Data (E:)
49.98 GB NTFS
Healthy (Basic Data Partition)
Disk 2
Basic
49.98 GB
Online
New Volume (F:)
49.98 GB NTFS
Healthy (Basic Data Partition)
Unallocated
Primary partition
Type here to search
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11/3/2025
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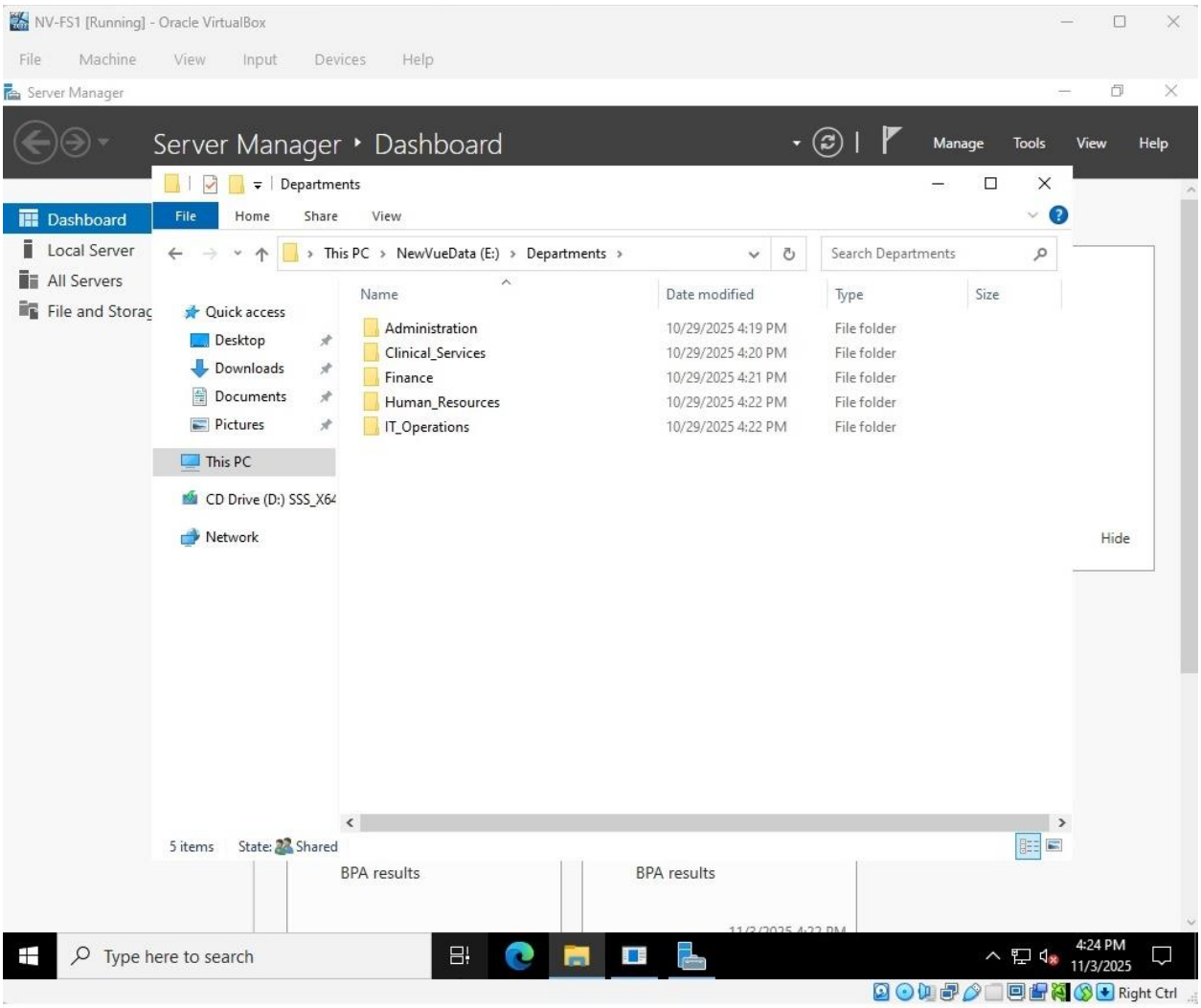
- **Evidence 5:** Screenshot of E:\Departments on NV-FS1 displaying departmental folders.

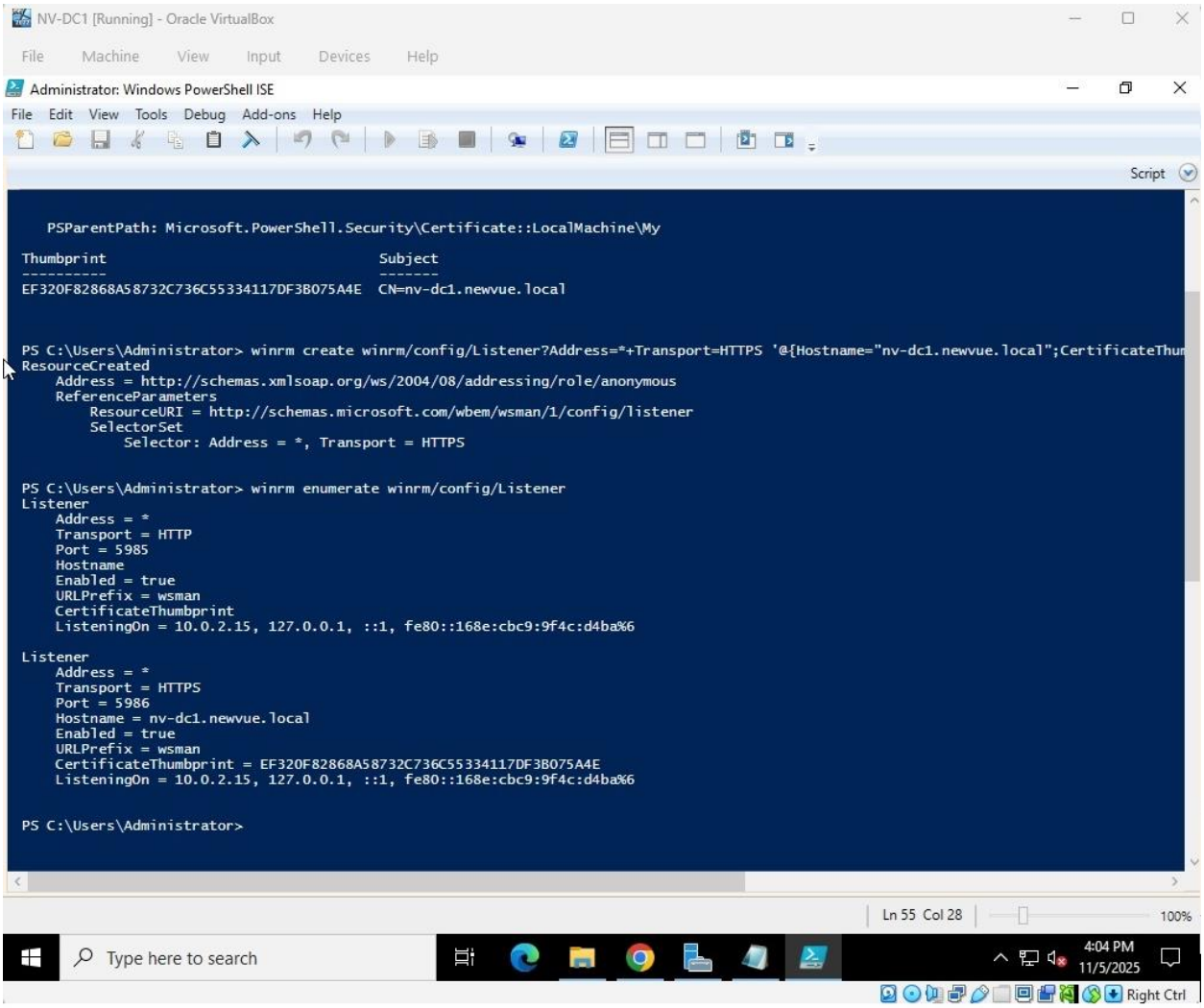


Task 3 – Configure WinRM over HTTPS and Establish Mutual Certificate Trust (20 pts)

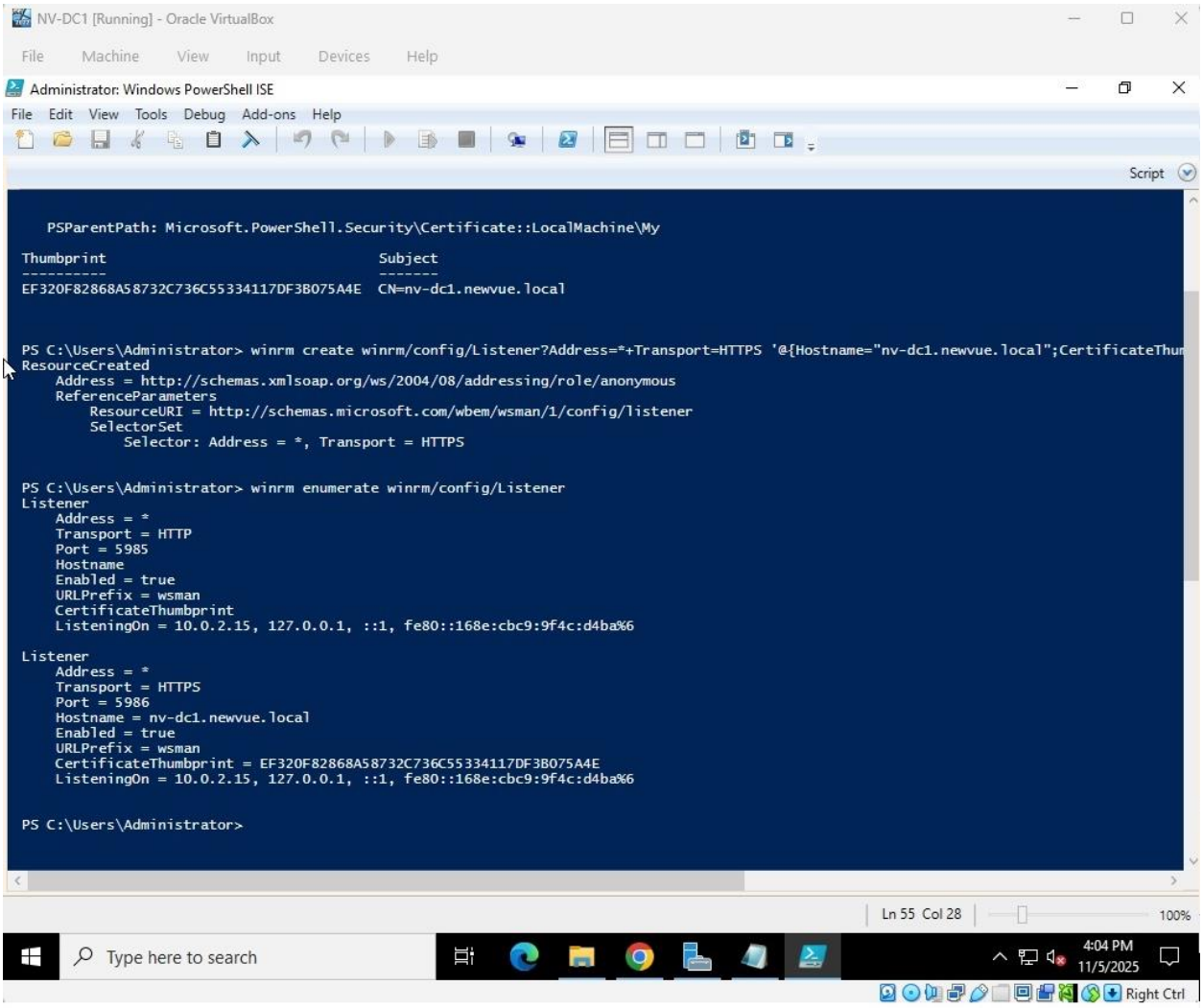
This task focused on securing inter-server communication through encrypted HTTPS management sessions. Self-signed certificates were created and exchanged between NV-FS1 and NV-DC1 to establish mutual authentication and secure PowerShell remoting.

Evidence Requirements:

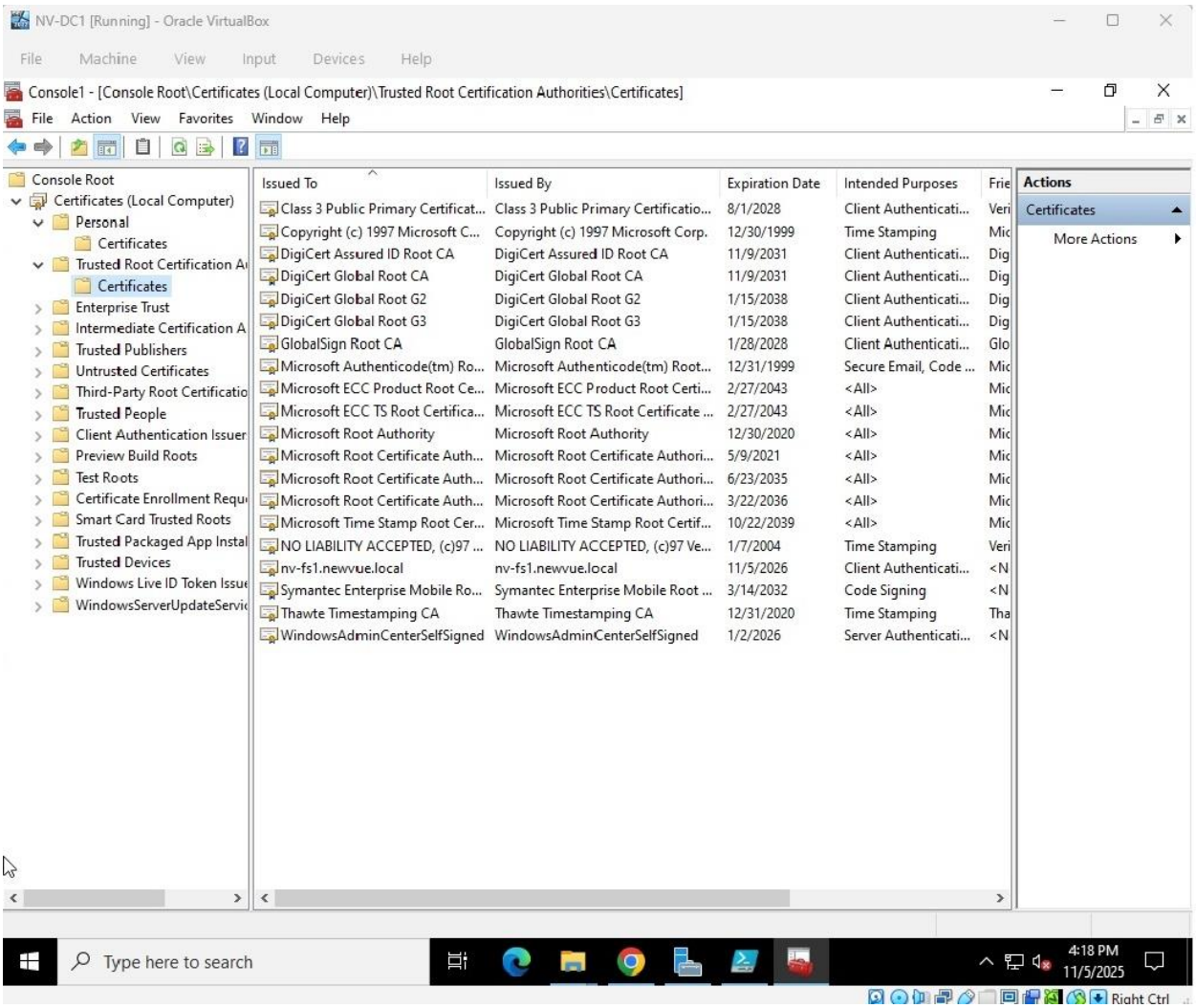
- **Evidence 6a:** WinRM HTTPS listener configuration on NV-DC1.

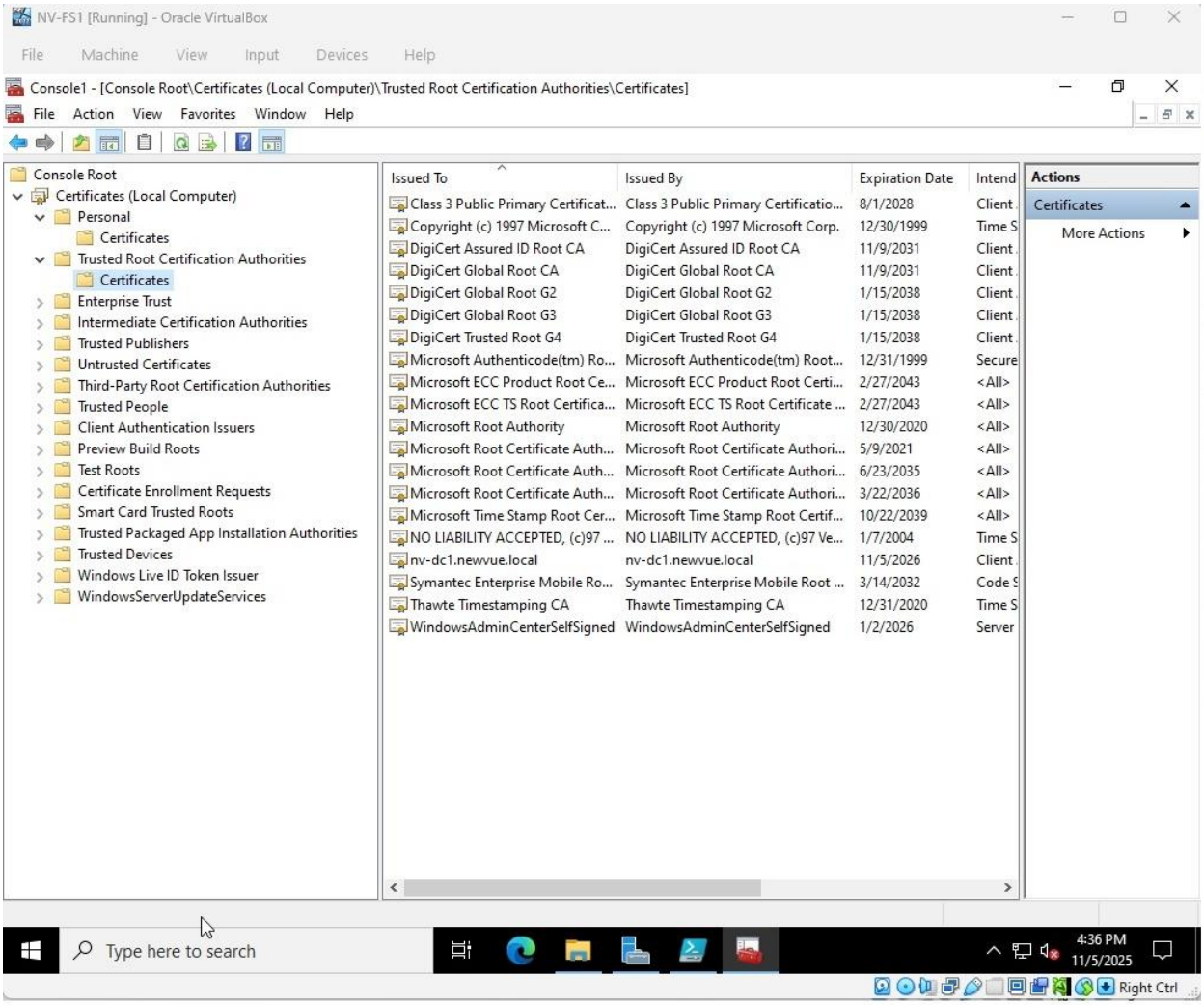


- **Evidence 6b:** WinRM HTTPS listener configuration on NV-FS1.



- **Evidence 6c:** Certificates imported into Trusted Root Certification Authorities on both servers.




NV-FS1 [Running] - Oracle VirtualBox
File Machine View Input Devices Help
Console1 - [Console Root\Certificates (Local Computer)\Trusted Root Certification Authorities\Certificates]
File Action View Favorites Window Help
Console Root
Certificates (Local Computer)
Personal
Certificates
Trusted Root Certification Authorities
Certificates
Enterprise Trust
Intermediate Certification Authorities
Trusted Publishers
Untrusted Certificates
Third-Party Root Certification Authorities
Trusted People
Client Authentication Issuers
Preview Build Roots
Test Roots
Certificate Enrollment Requests
Smart Card Trusted Roots
Trusted Packaged App Installation Authorities
Trusted Devices
Windows Live ID Token Issuer
WindowsServerUpdateServices
Issued To
Issued By
Expiration Date
Intend
Class 3 Public Primary Certificat... Class 3 Public Primary Certificatio... 8/1/2028 Client
Copyright (c) 1997 Microsoft C... Copyright (c) 1997 Microsoft Corp. 12/30/1999 Time S
DigiCert Assured ID Root CA DigiCert Assured ID Root CA 11/9/2031 Client
DigiCert Global Root CA DigiCert Global Root CA 11/9/2031 Client
DigiCert Global Root G2 DigiCert Global Root G2 1/15/2038 Client
DigiCert Global Root G3 DigiCert Global Root G3 1/15/2038 Client
DigiCert Trusted Root G4 DigiCert Trusted Root G4 1/15/2038 Client
Microsoft Authenticode(tm) Ro... Microsoft Authenticode(tm) Root... 12/31/1999 Secure
Microsoft ECC Product Root Ce... Microsoft ECC Product Root Certi... 2/27/2043 <All>
Microsoft ECC TS Root Certifica... Microsoft ECC TS Root Certificate ... 2/27/2043 <All>
Microsoft Root Authority Microsoft Root Authority 12/30/2020 <All>
Microsoft Root Certificate Auth... Microsoft Root Certificate Authori... 5/9/2021 <All>
Microsoft Root Certificate Auth... Microsoft Root Certificate Authori... 6/23/2035 <All>
Microsoft Root Certificate Auth... Microsoft Root Certificate Authori... 3/22/2036 <All>
Microsoft Time Stamp Root Cer... Microsoft Time Stamp Root Certif... 10/22/2039 <All>
NO LIABILITY ACCEPTED, (c)97 ... NO LIABILITY ACCEPTED, (c)97 Ve... 1/7/2004 Time S
nv-dc1.newvue.local nv-dc1.newvue.local 11/5/2026 Client
Symantec Enterprise Mobile Ro... Symantec Enterprise Mobile Root ... 3/14/2032 Code S
Thawte Timestamping CA Thawte Timestamping CA 12/31/2020 Time S
WindowsAdminCenterSelfSigned WindowsAdminCenterSelfSigned 1/2/2026 Server
Actions
Certificates
More Actions
Type here to search
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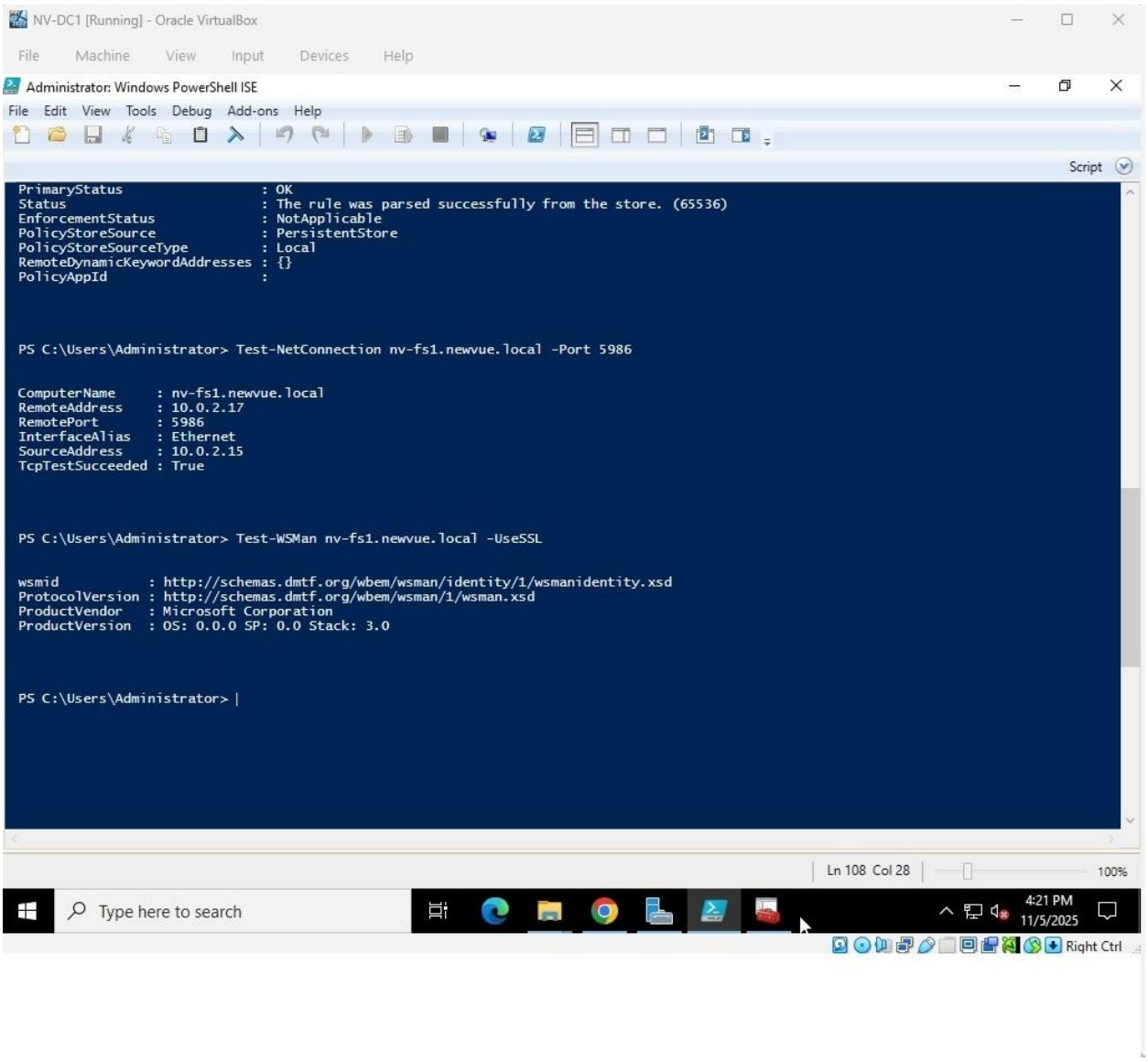
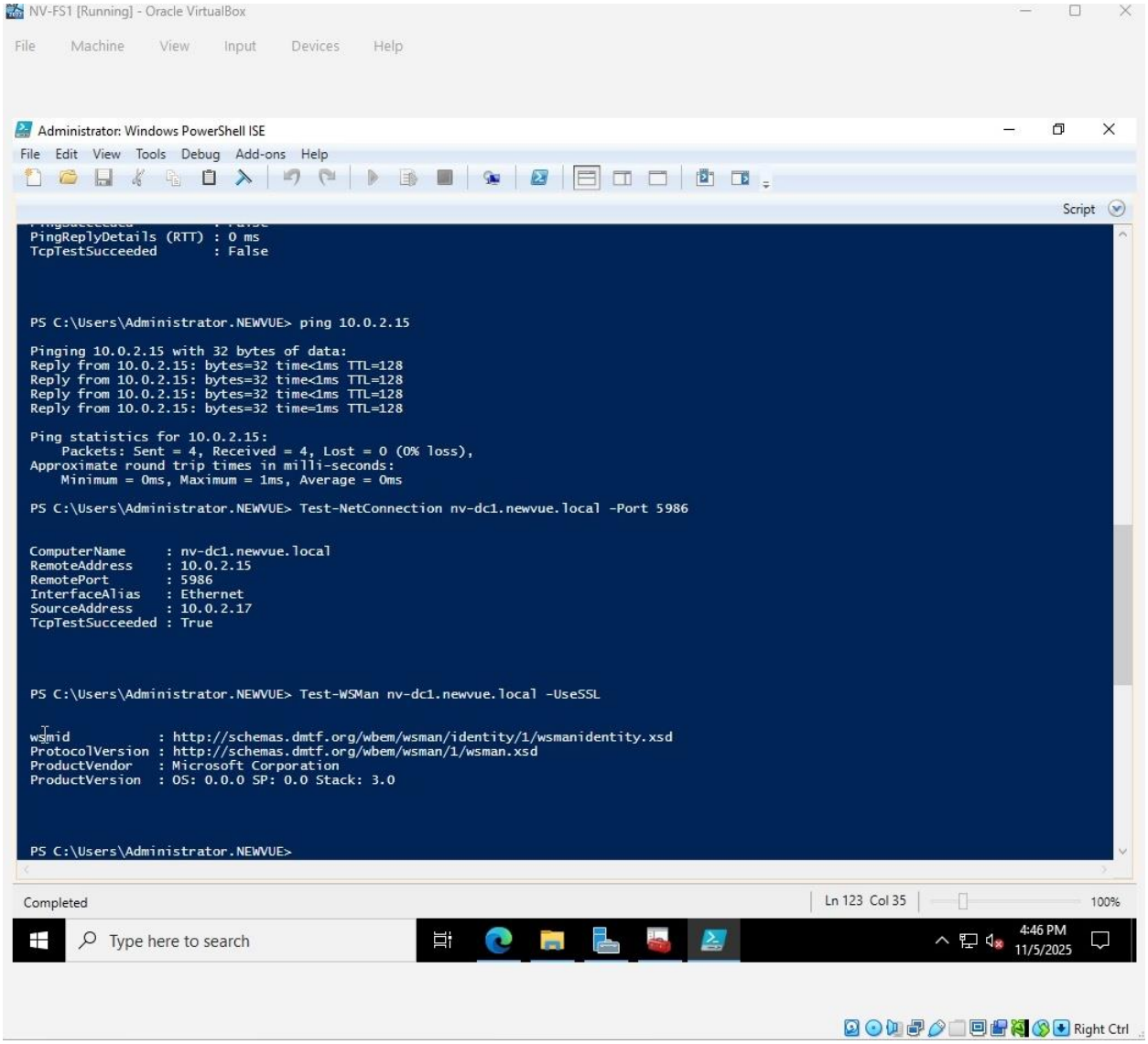
Right Ctrl

- **Evidence 6d:** Successful Test-WSMan -UseSSL results confirming secure connectivity.




NV-FS1 [Running] - Oracle VirtualBox
File Machine View Input Devices Help
Administrator: Windows PowerShell ISE
File Edit View Tools Debug Add-ons Help
Script
PingReplyDetails (RTT) : 0 ms
TcpTestSucceeded : False
PS C:\Users\Administrator.NEWVUE> ping 10.0.2.15
Pinging 10.0.2.15 with 32 bytes of data:
Reply from 10.0.2.15: bytes=32 time<1ms TTL=128
Reply from 10.0.2.15: bytes=32 time<1ms TTL=128
Reply from 10.0.2.15: bytes=32 time<1ms TTL=128
Reply from 10.0.2.15: bytes=32 time=1ms TTL=128
Ping statistics for 10.0.2.15:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 1ms, Average = 0ms
PS C:\Users\Administrator.NEWVUE> Test-NetConnection nv-dc1.newvue.local -Port 5986
ComputerName : nv-dc1.newvue.local
RemoteAddress : 10.0.2.15
RemotePort : 5986
InterfaceAlias : Ethernet
SourceAddress : 10.0.2.17
TcpTestSucceeded : True
PS C:\Users\Administrator.NEWVUE> Test-WSMan nv-dc1.newvue.local -UseSSL
wsmid : http://schemas.dmtf.org/wbem/wsman/identity/1/wsmanidentity.xsd
ProtocolVersion : http://schemas.dmtf.org/wbem/wsman/1/wsman.xsd
ProductVendor : Microsoft Corporation
ProductVersion : OS: 0.0.0 SP: 0.0 Stack: 3.0
PS C:\Users\Administrator.NEWVUE>
Completed
Ln 123 Col 35
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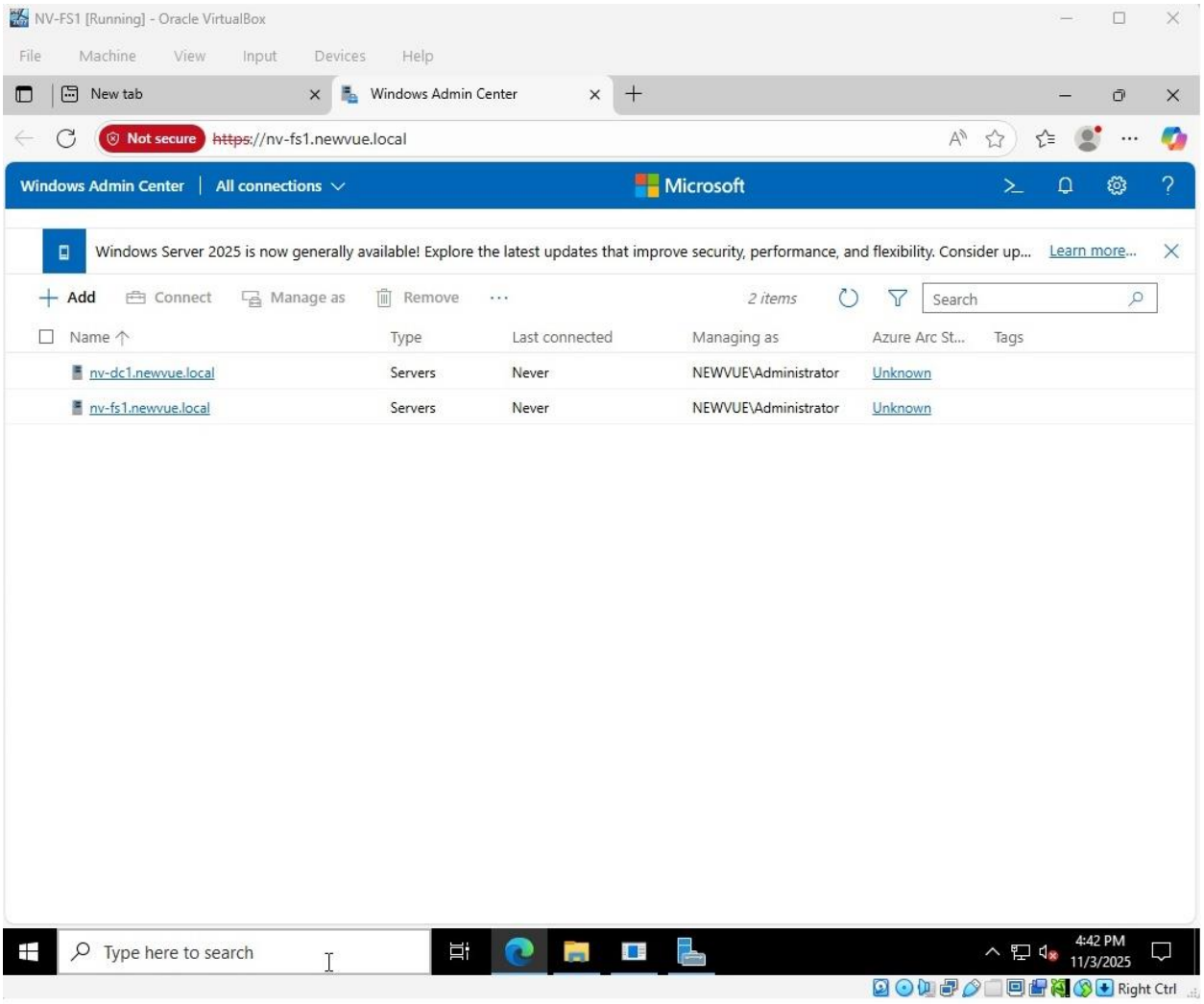
Task 4 – Install and Configure Windows Admin Center (10 pts)

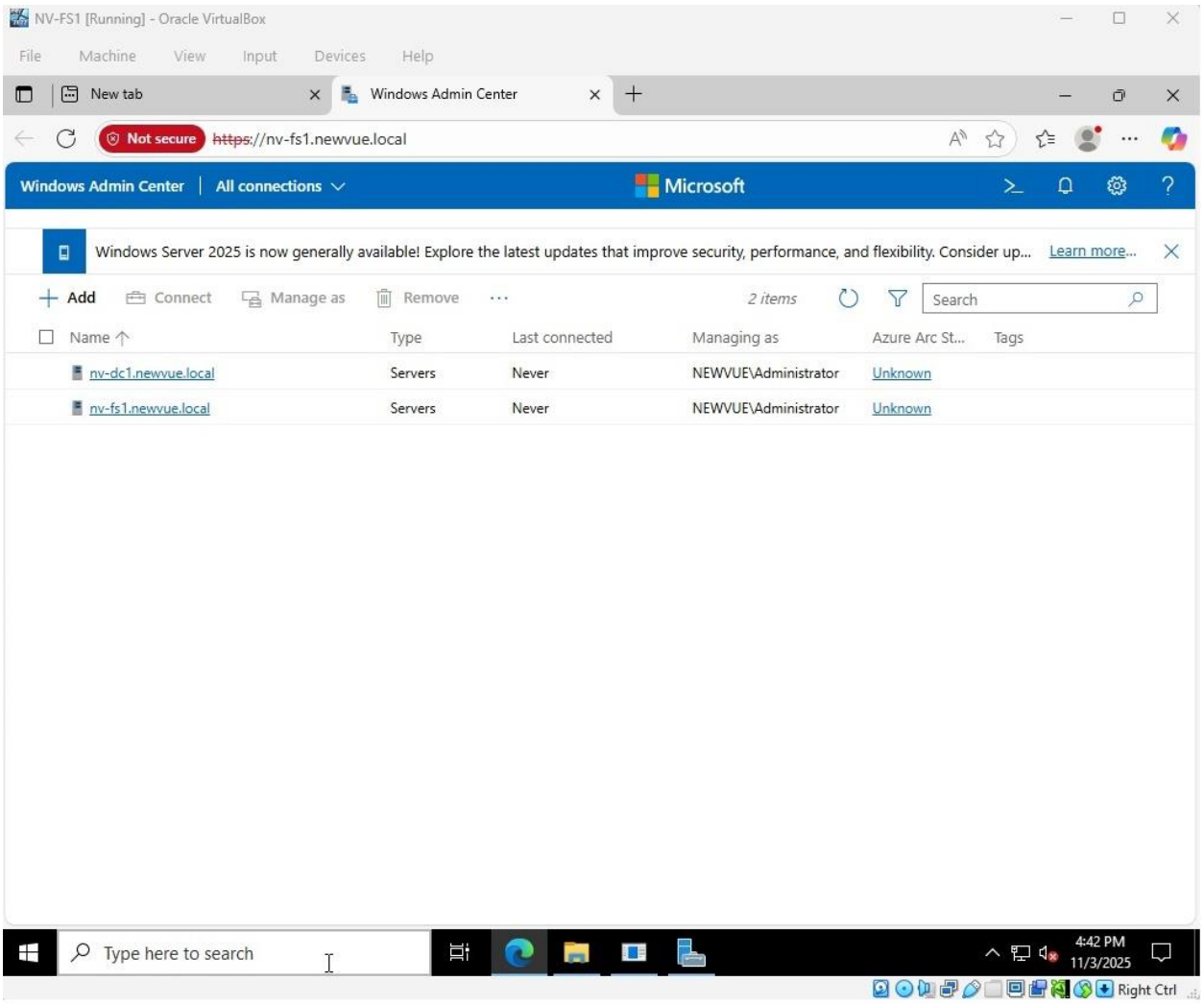
Windows Admin Center was installed on NV-FS1 to centrally manage servers and monitor replication status. Both NV-FS1 and NV-DC1 were added for management and verification.

Evidence Requirements:

- **Evidence 7:** Screenshot showing successful WAC login on NV-FS1.



- **Evidence 8:** Screenshot showing both servers connected in WAC under All Connections.

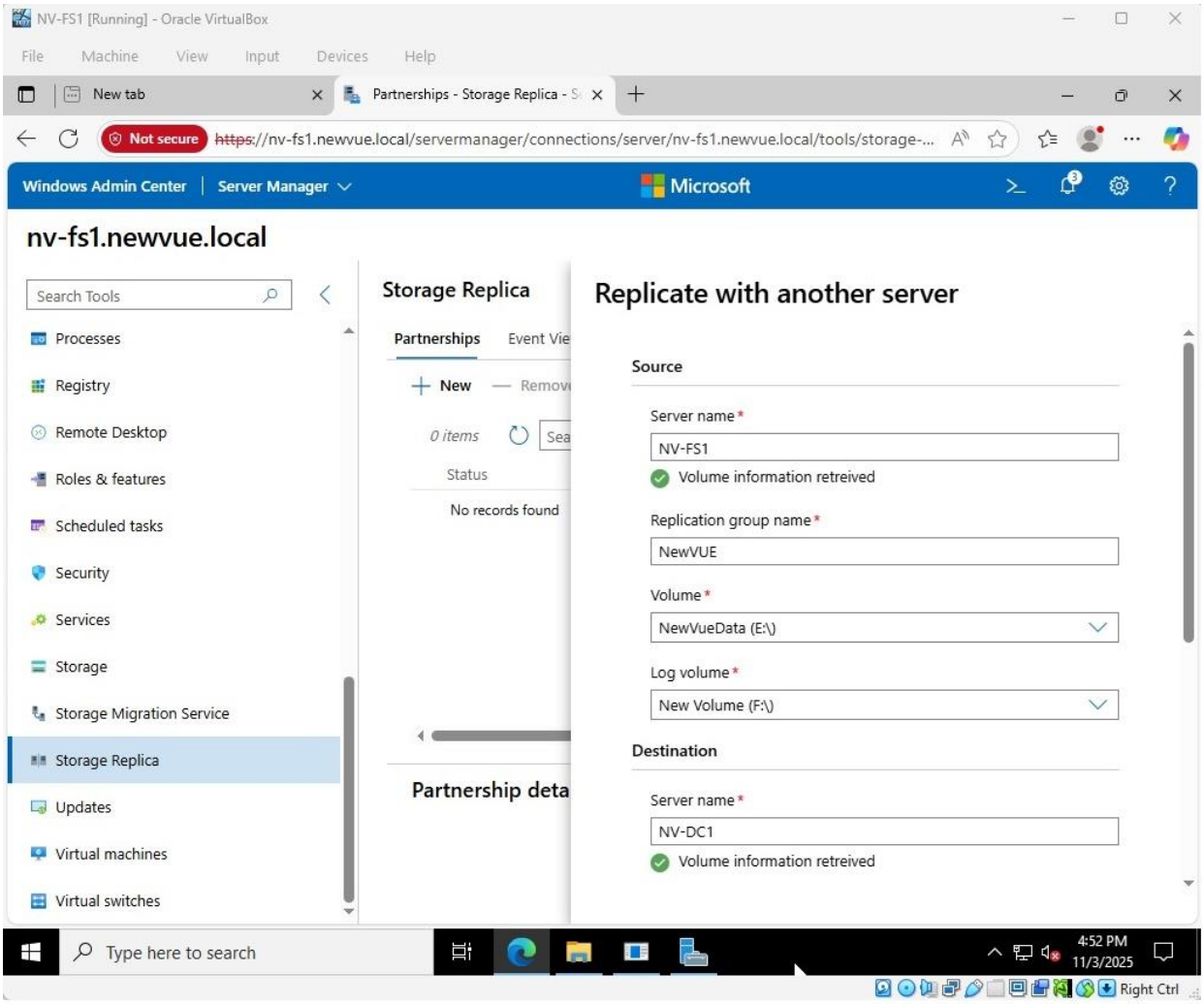


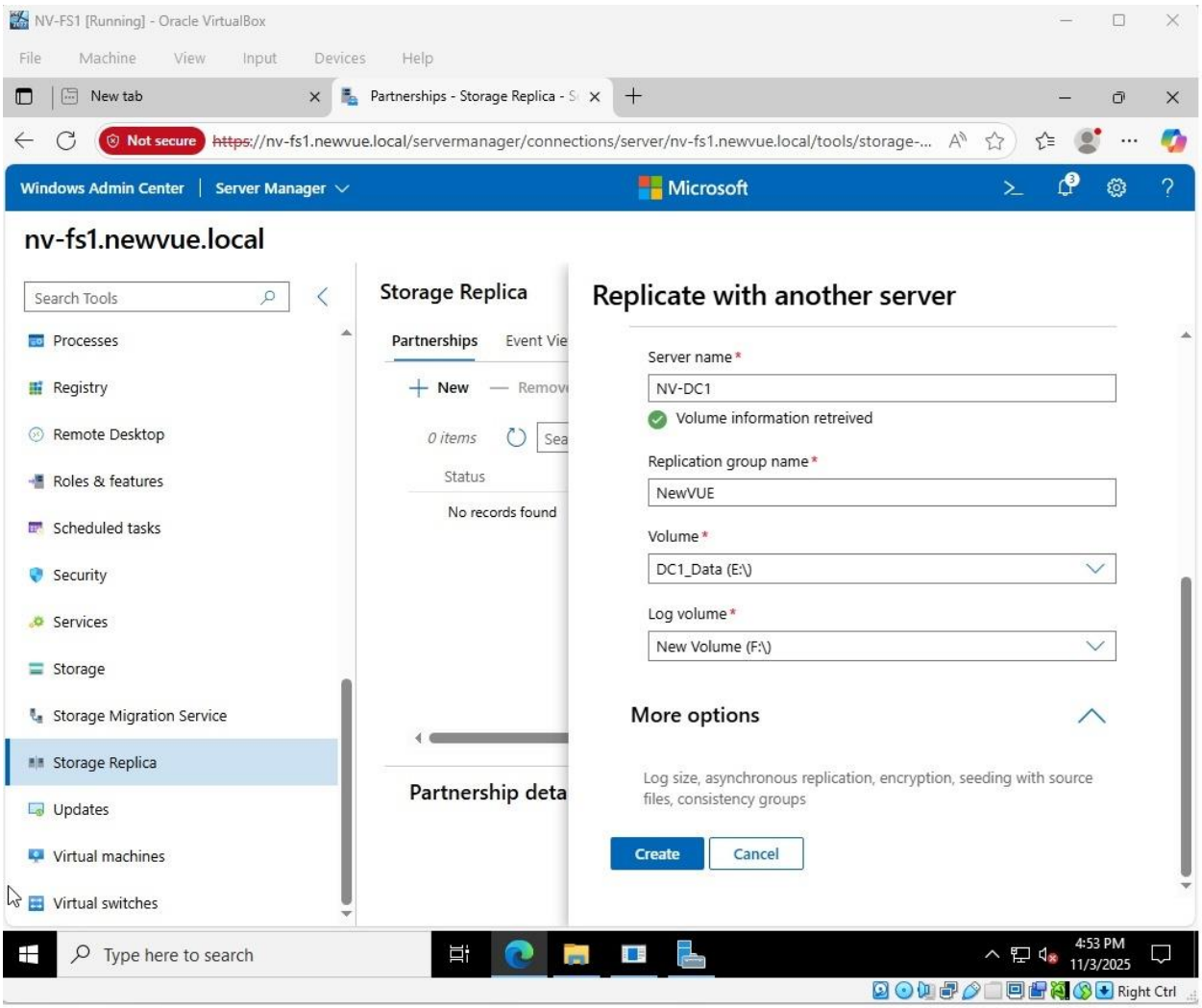
Task 5 – Create and Configure Replication Partnership (30 pts)

A replication partnership was established between NV-FS1 and NV-DC1 using Windows Admin Center. Synchronous replication mode was selected to ensure zero data loss between both servers.

Evidence Requirements:

- **Evidence 9:** Screenshot showing replication configuration summary in WAC.




NV-FS1 [Running] - Oracle VirtualBox
File Machine View Input Devices Help
New tab
Partnerships - Storage Replica - S
Not secure https://nv-fs1.newvue.local/servermanager/connections/server/nv-fs1.newvue.local/tools/storage-...
Windows Admin Center | Server Manager
Microsoft
nv-fs1.newvue.local
Search Tools
Processes
Registry
Remote Desktop
Roles & features
Scheduled tasks
Security
Services
Storage
Storage Migration Service
Storage Replica
Updates
Virtual machines
Virtual switches
Storage Replica
Partnerships
Event Vie
New
Remov
0 items
Sea
Status
No records found
Partnership deta
Replicate with another server
Server name *
NV-DC1
Volume information retreived
Replication group name *
NewVUE
Volume *
DC1_Data (E:\)
Log volume *
New Volume (F:\)
More options
Log size, asynchronous replication, encryption, seeding with source files, consistency groups
Create
Cancel
Type here to search
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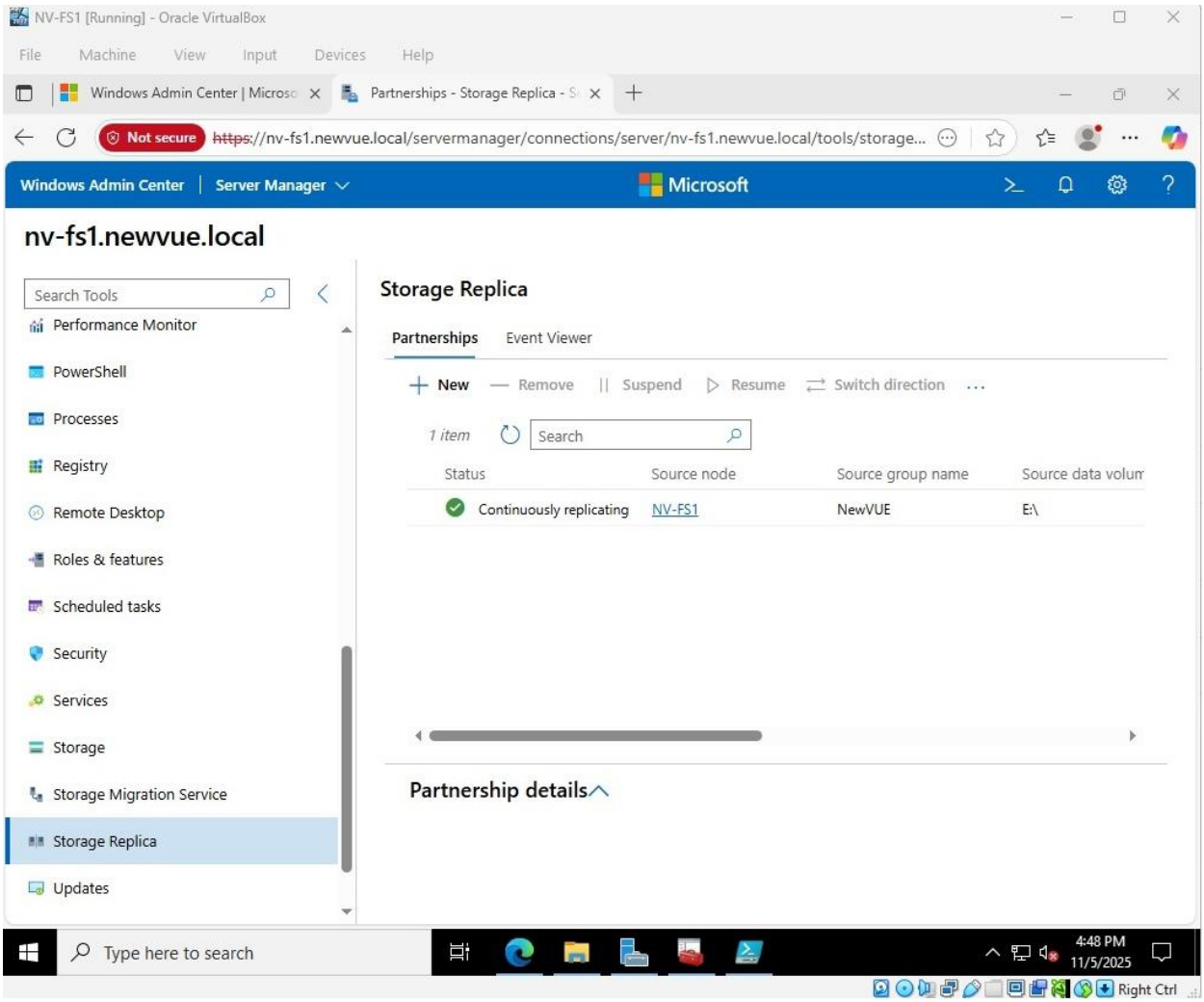
Right Ctrl

- **Evidence 10:** Screenshot confirming successful partnership creation and synchronization.

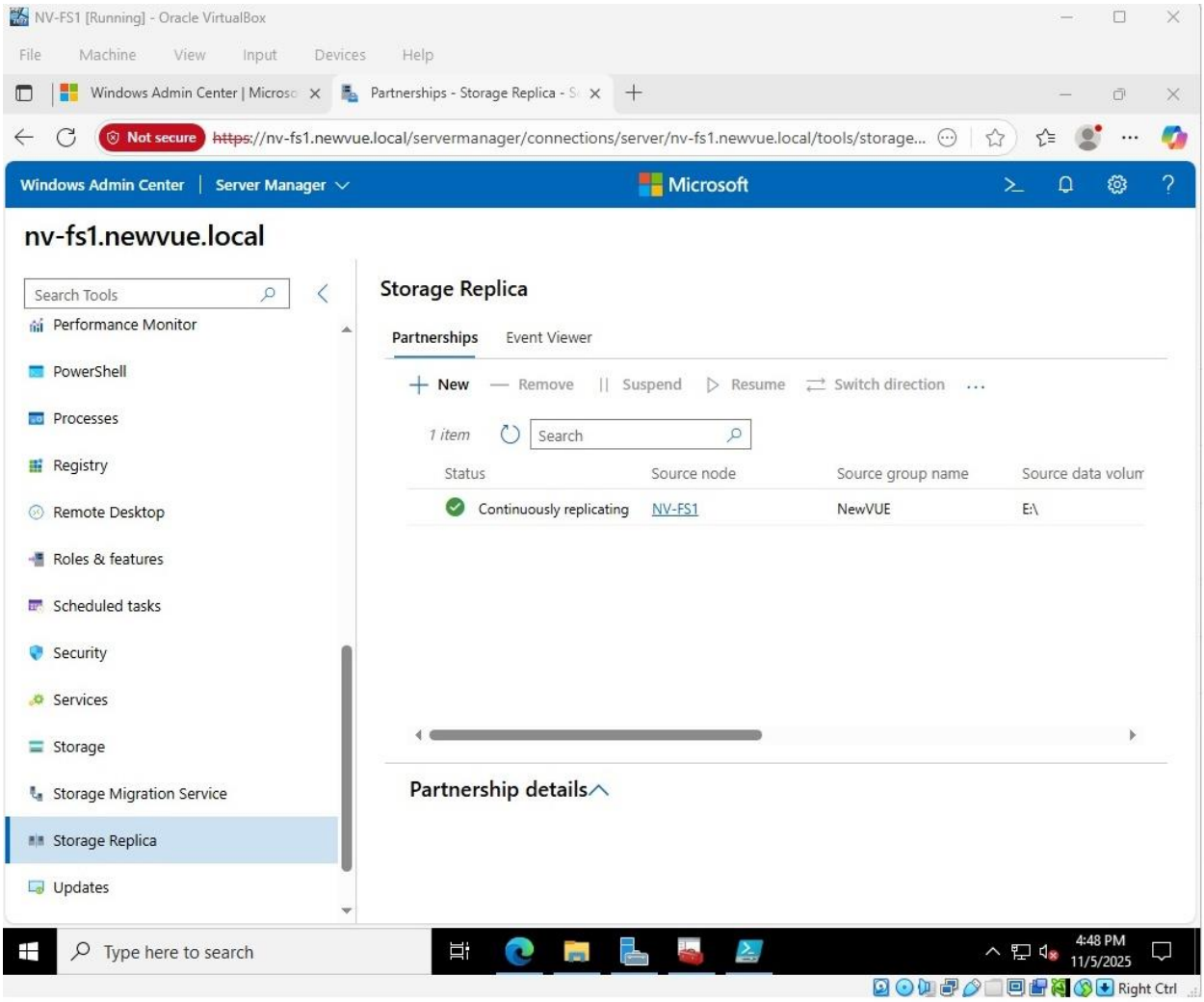


Task 6 – Monitor, Validate, and Simulate Failure (40 pts)

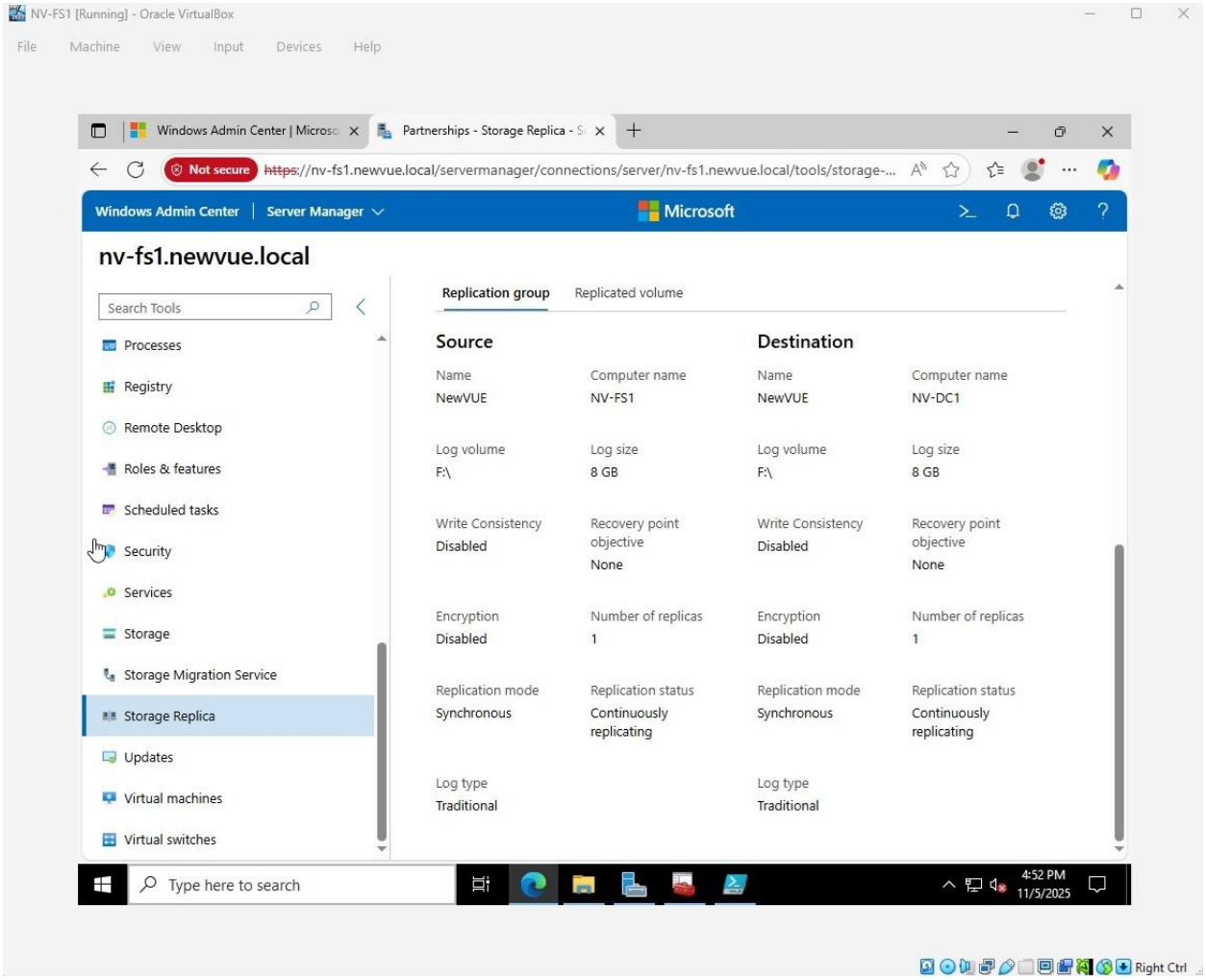
This task verified replication health, validated synchronization status, and simulated a failure scenario to confirm read-only access to replicated data. Replication status and direction were confirmed in both Windows Admin Center and PowerShell using the Get-SRGroup and Get-SRPartnership cmdlets.

Evidence Requirements:

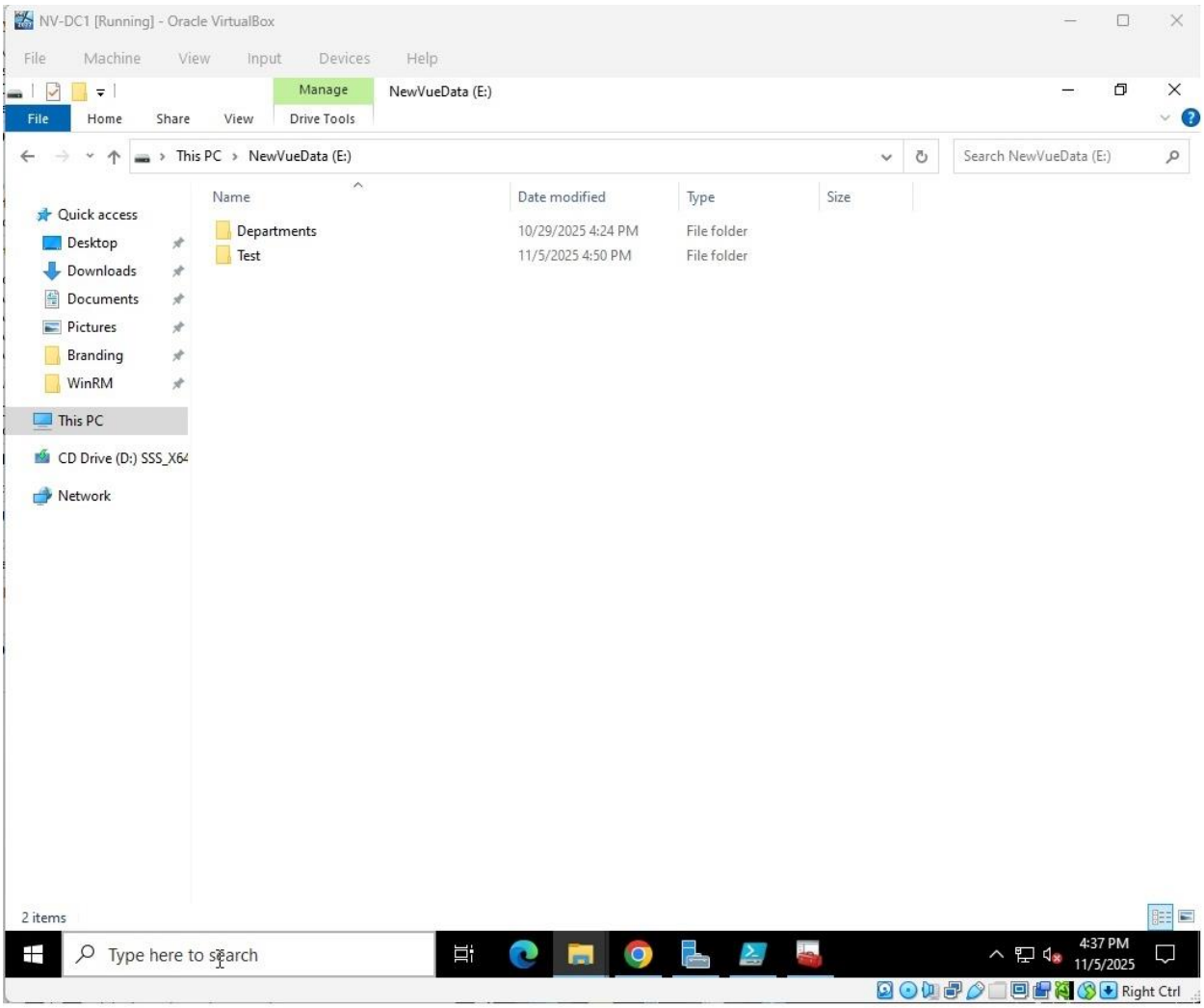
- **Evidence 11:** Screenshot showing replication status = *Continuously Replicating*.



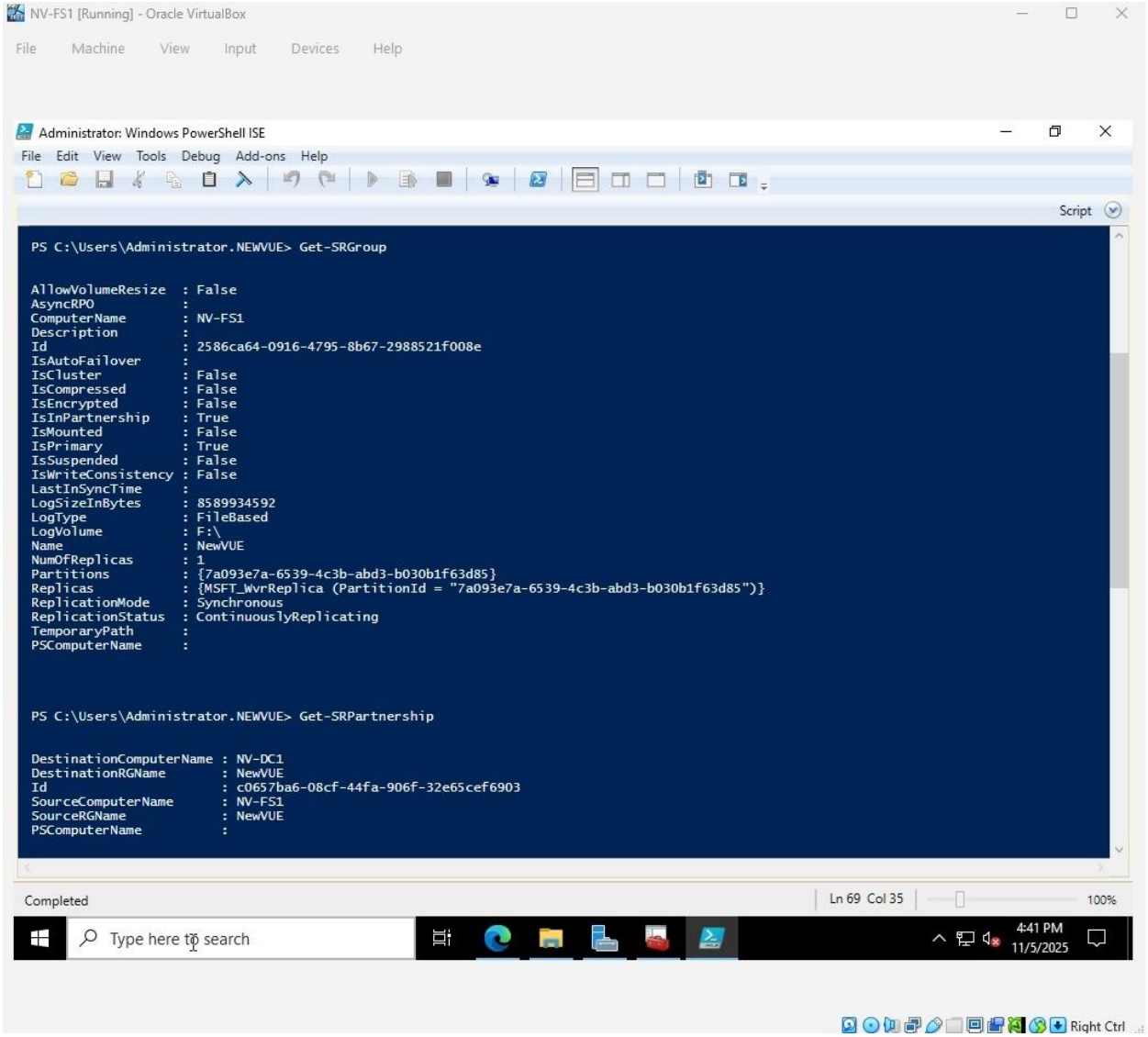
- **Evidence 12a:** Screenshot of **Partnerships** view showing replication health.



- **Evidence 12b:** Screenshot of **E:\Departments** on NV-DC1 after **Switch Direction** showing Replication_Test.



- **Evidence 12c:** Screenshot of PowerShell output from Get-SRGroup and Get-SRPartnership.



Below evidence were unable to obtained due to error encountered and time.

- **Evidence 13a:** Screenshot showing **E:** online on NV-DC1 during NV-FS1 outage.
- **Evidence 13b:** Screenshot showing **Access Denied** when modifying data.
- **Evidence 13c:** Screenshot of PowerShell output showing replication paused/resumed.
- **Evidence 13d:** Screenshot showing replication resumed after recovery.

Section 3: Summary of Results (10 pts)

The implementation of Storage Replica was successfully completed, establishing a robust core replication partnership between NV-FS1 and NV-DC1. Key achievements include the successful installation of the Storage Replica feature, the secure configuration of WinRM over HTTPS for encrypted management communication, and the creation of a functional synchronous replication partnership via Windows Admin Center. Continuous monitoring confirmed a healthy replication status, with data synchronizing seamlessly from the source (NV-FS1) to the destination (NV-DC1) during normal operations.

A planned failure simulation was initiated to validate disaster recovery procedures. During this test, after simulating a failure of NV-FS1, the replicated data volume (E:) on NV-DC1 was confirmed to be "Online" in Disk Management, indicating the storage layer was active. However, an "NTFS" error prevented access to the volume via File Explorer, which halted further testing and prevented the collection of evidence (13a-d) to verify read-only client accessibility and detailed replication state changes.

This outcome confirms that the underlying block-level replication was operational but highlights a potential configuration issue with the file system mount point or access permissions on the destination volume during a failover event. Therefore, while the implementation proves the replication technology is sound, full validation of the business continuity failover process requires further investigation and testing.