

11/3/2025

Classroom Project: Invaders Inc.

Kyle Wenzel



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Diagrams:

Network Diagram:

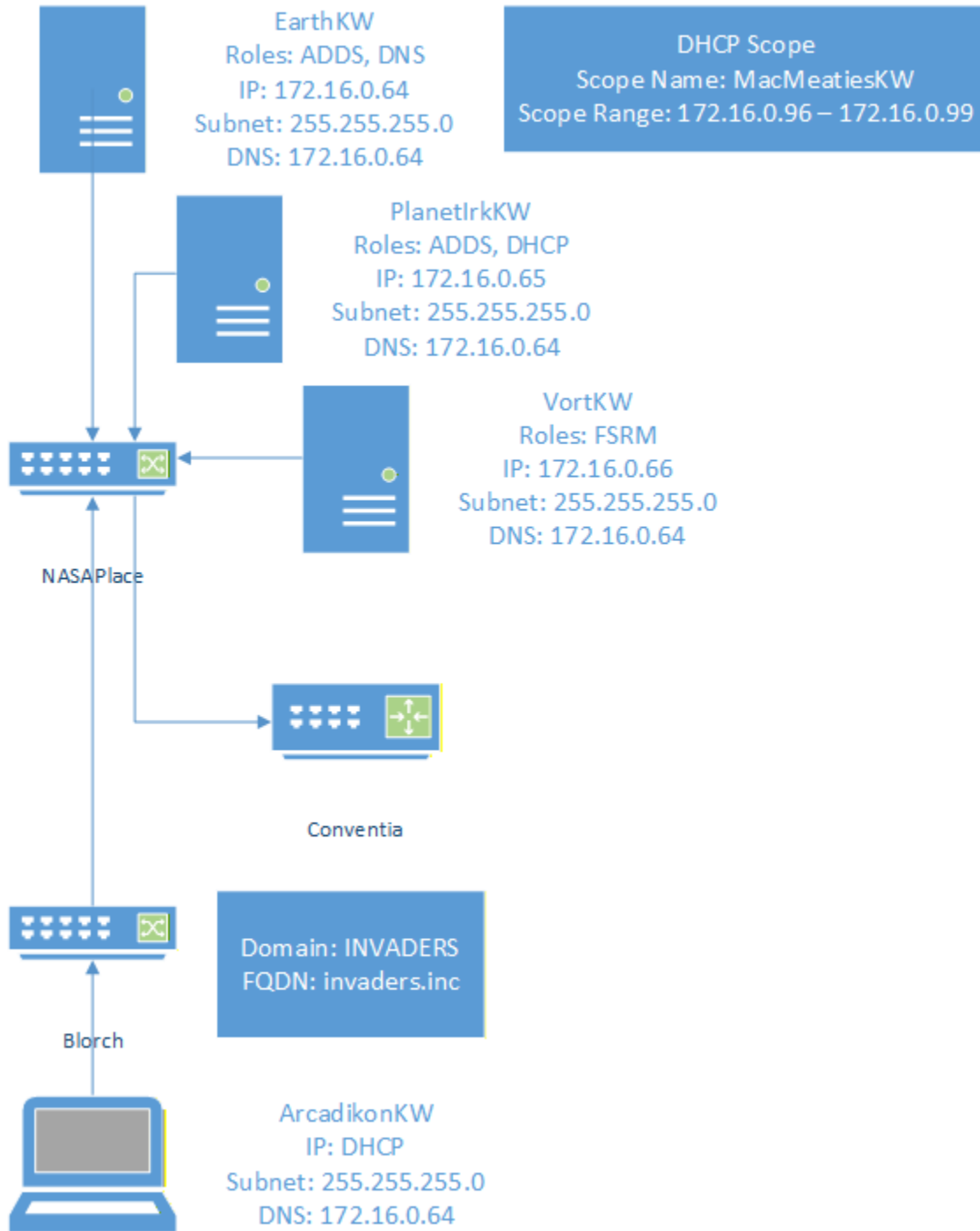


Figure 1 A diagram of the network and server descriptions

ADDS Diagram:

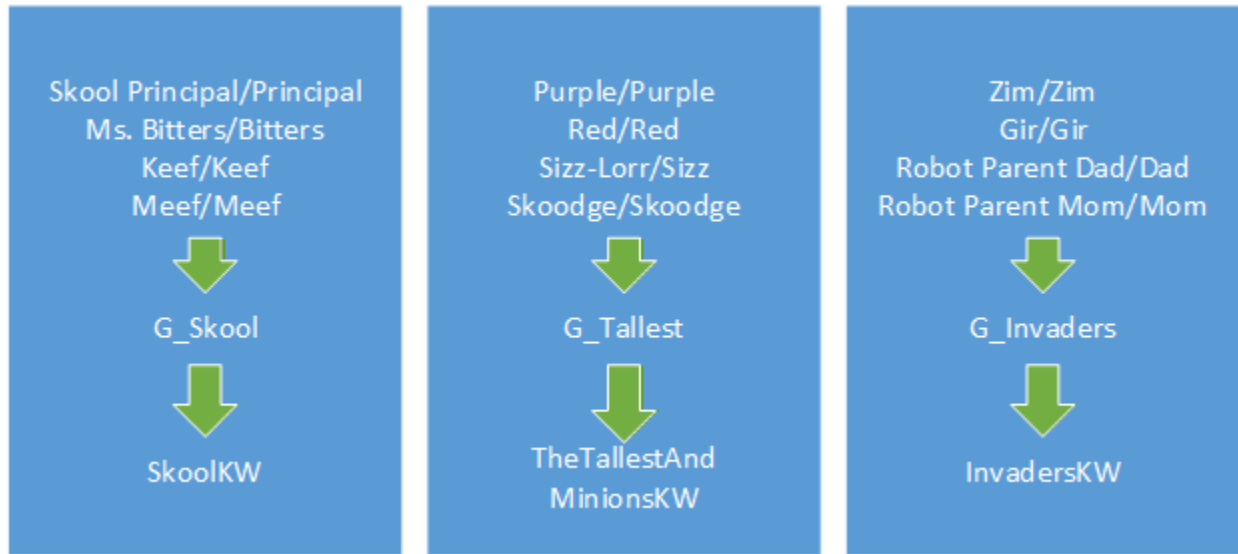


Figure 2 A diagram of the user, group, and OU hierarchy

Shared Folder Diagram:



Figure 3 A diagram of all the shared folders

Build:

Initial Build:

Server 1:

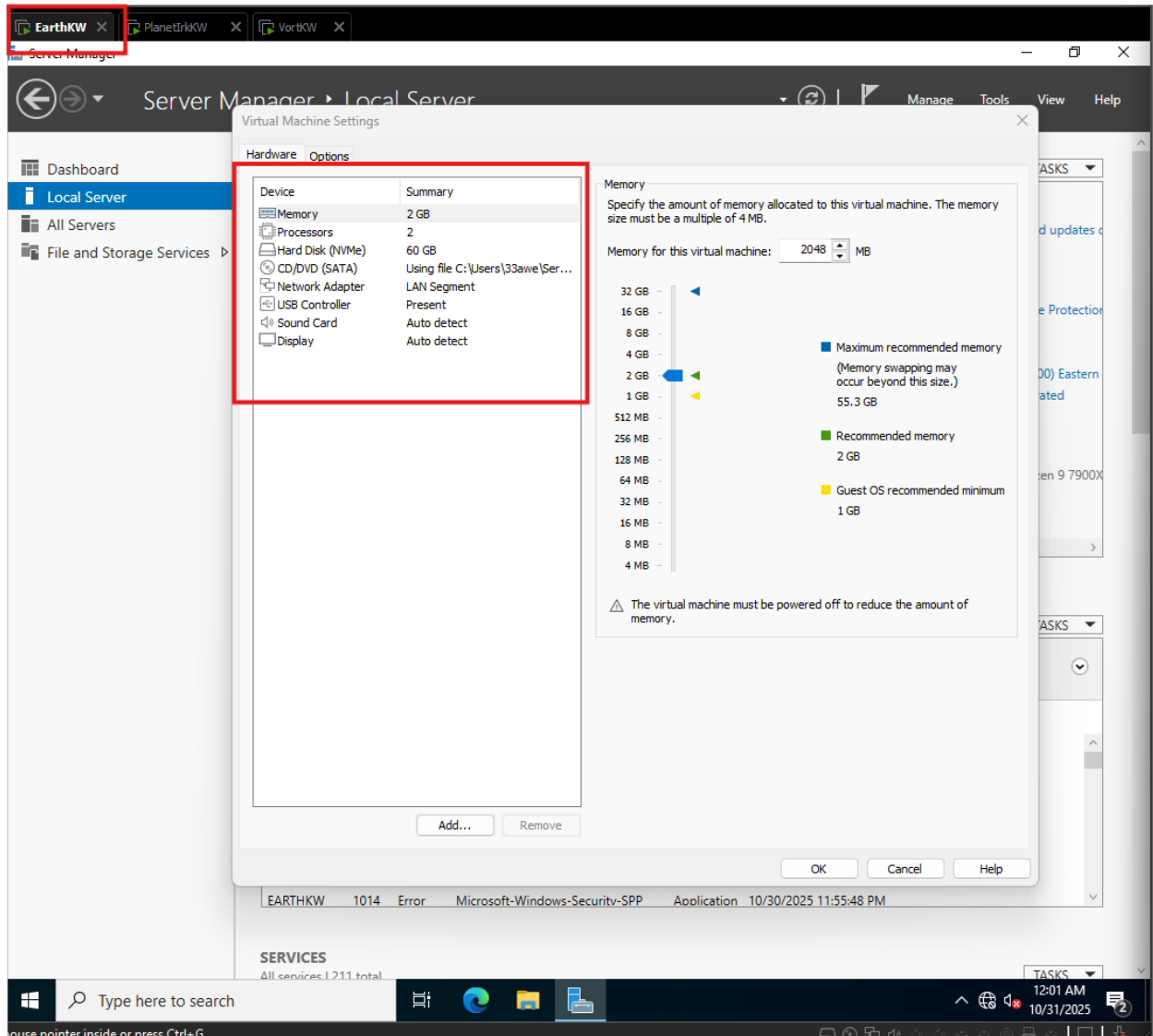


Figure 4 The hardware configuration for Server 1 (EarthKW)

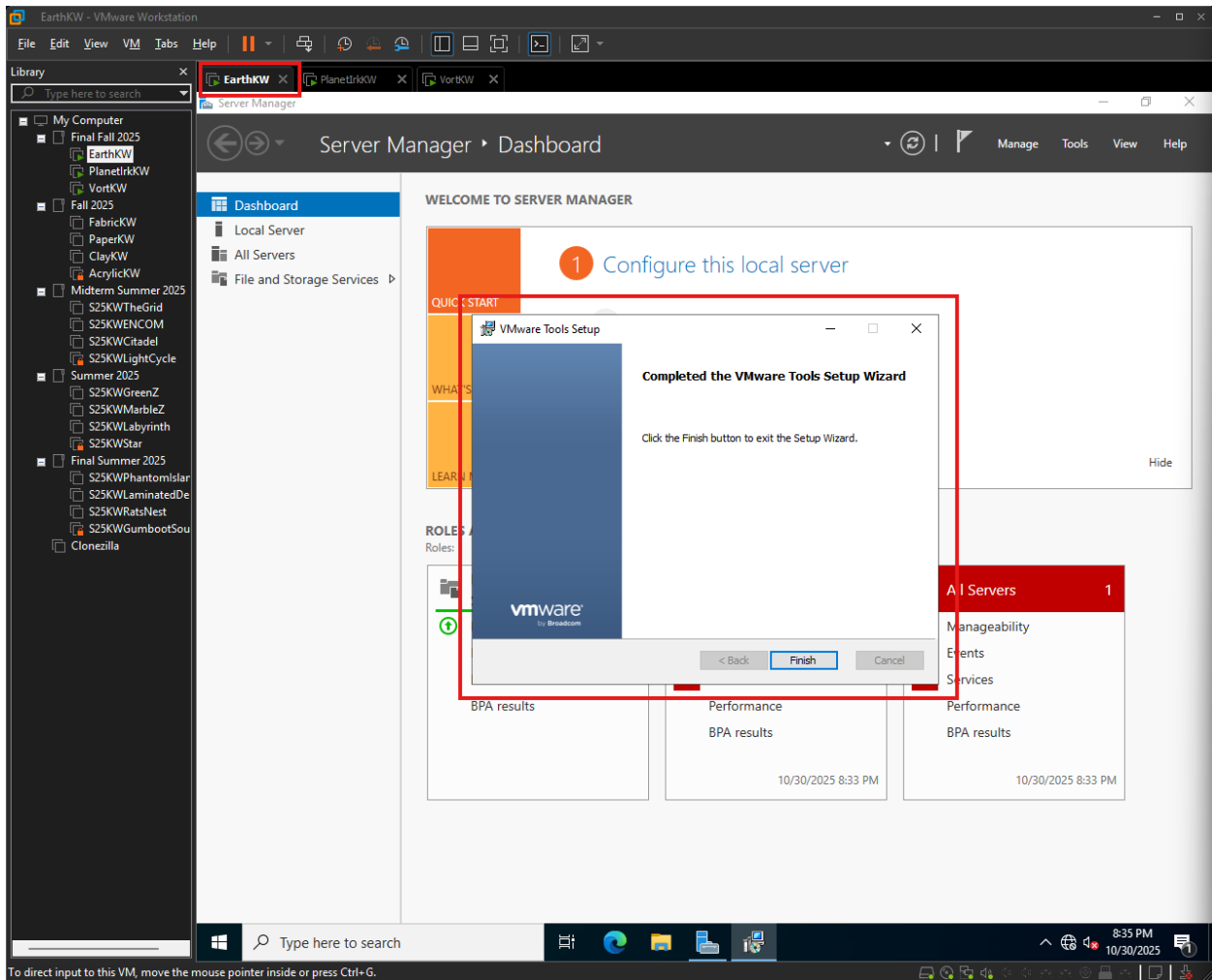


Figure 5 VMWare Tools has been installed on Server 1

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

Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\Users\Administrator> Set-Timezone -ID "Eastern Standard Time"
PS C:\Users\Administrator> Rename-Computer -NewName "EarthKw"
WARNING: The changes will take effect after you restart the computer WTN-AVVCPE0TV35.
PS C:\Users\Administrator>
```

Figure 6 The timezone and computer name have been set on Server 1

```
PS C:\Users\Administrator> Set-Timezone -ID "Eastern Standard Time"
PS C:\Users\Administrator> Rename-Computer -NewName "EarthKw"
WARNING: The changes will take effect after you restart the computer WTN-AVVCPE0TV35.
PS C:\Users\Administrator> PowerCFG /L

Existing Power Schemes (* Active)
-----
Power Scheme GUID: 381b4222-f694-41f0-9685-ff5bb260df2e (Balanced) *
Power Scheme GUID: 8c5e7fda-e8bf-4a96-9a85-a6e23a8c635c (High performance)
Power Scheme GUID: a1841308-3541-4fab-bc81-f71556f20b4a (Power saver)
PS C:\Users\Administrator> PowerCFG /change monitor-timeout-ac 0
PS C:\Users\Administrator> PowerCFG /change monitor-timeout-dc 0
PS C:\Users\Administrator>
```

Figure 7 Sleep has been turned off

```
Administrator: Windows PowerShell
PS C:\Users\Administrator> Get-NetAdapter

Name                InterfaceDescription          ifIndex Status      MacAddress          LinkSpeed
-----                -
Ethernet0           Intel(R) 82574L Gigabit Network Conn... 5 Up          00-0C-29-52-26-10 1 Gbps

PS C:\Users\Administrator> Set-NetIPInterface -InterfaceAlias "Ethernet0" -DHCP Disabled -Passthru

ifIndex InterfaceAlias          AddressFamily NlMtu(Bytes) InterfaceMetric Dhcp      ConnectionState PolicyStore
-----                -
5        Ethernet0                 IPv6          1500         25 Disabled Connected ActiveStore
5        Ethernet0                 IPv4          1500         25 Disabled Connected ActiveStore

PS C:\Users\Administrator> _
```

Figure 8 DHCP has been disabled

```
Administrator: Windows PowerShell
PS C:\Users\Administrator> New-NetIPAddress -AddressFamily IPv4 -InterfaceAlias "Ethernet0" -IPAddress 172.16.0.64 -PrefixLength 24

IPAddress          : 172.16.0.64
InterfaceIndex     : 5
InterfaceAlias     : Ethernet0
AddressFamily      : IPv4
Type               : Unicast
PrefixLength       : 24
PrefixOrigin       : Manual
SuffixOrigin       : Manual
AddressState       : Tentative
ValidLifetime      : Infinite ([TimeSpan]::MaxValue)
PreferredLifetime  : Infinite ([TimeSpan]::MaxValue)
SkipAsSource       : False
PolicyStore        : ActiveStore

IPAddress          : 172.16.0.64
InterfaceIndex     : 5
InterfaceAlias     : Ethernet0
AddressFamily      : IPv4
Type               : Unicast
PrefixLength       : 24
PrefixOrigin       : Manual
SuffixOrigin       : Manual
AddressState       : Invalid
ValidLifetime      : Infinite ([TimeSpan]::MaxValue)
PreferredLifetime  : Infinite ([TimeSpan]::MaxValue)
```

Figure 9A static IP has been configured

```
Administrator: Windows PowerShell

IPAddress      : 172.16.0.64
InterfaceIndex : 5
InterfaceAlias : Ethernet0
AddressFamily  : IPv4
Type           : Unicast
PrefixLength   : 24
PrefixOrigin   : Manual
SuffixOrigin   : Manual
AddressState   : Invalid
ValidLifetime  : Infinite ([TimeSpan]::MaxValue)
PreferredLifetime : Infinite ([TimeSpan]::MaxValue)
SkipAsSource   : False
PolicyStore    : PersistentStore

PS C:\Users\Administrator> Set-DNSClientServerAddress -InterfaceAlias "Ethernet0" -ServerAddress 172.16.0.64
PS C:\Users\Administrator>
```

Figure 10 DNS has been configured

```
Administrator: Windows PowerShell

IPAddress      : 172.16.0.64
InterfaceIndex : 5
InterfaceAlias : Ethernet0
AddressFamily  : IPv4
Type           : Unicast
PrefixLength   : 24
PrefixOrigin   : Manual
SuffixOrigin   : Manual
AddressState   : Invalid
ValidLifetime  : Infinite ([TimeSpan]::MaxValue)
PreferredLifetime : Infinite ([TimeSpan]::MaxValue)
SkipAsSource   : False
PolicyStore    : PersistentStore

PS C:\Users\Administrator> Set-DNSClientServerAddress -InterfaceAlias "Ethernet0" -ServerAddress 172.16.0.64
PS C:\Users\Administrator> Set-ItemProperty -Path "HKLM:\Software\Microsoft\Windows\CurrentVersion\Policies\System\" -Name "EnableLUA" -Value 0
PS C:\Users\Administrator>
```

Figure 11 UAC has been disabled

```
Administrator: Windows PowerShell
5 - Connect this server to cloud services

IPAddress      : 172.16.0.64
InterfaceIndex : 5
InterfaceAlias : Ethernet0
AddressFamily  : IPv4
Type           : Unicast
PrefixLength   : 24
PrefixOrigin   : Manual
SuffixOrigin    : Manual
AddressState   : Invalid
ValidLifetime  : Infinite ([TimeSpan]::MaxValue)
PreferredLifetime : Infinite ([TimeSpan]::MaxValue)
SkipAsSource   : False
PolicyStore    : PersistentStore

PS C:\Users\Administrator> Set-DNSClientServerAddress -InterfaceAlias "Ethernet0" -ServerAddress 172.16.0.64
PS C:\Users\Administrator> Set-ItemProperty -Path "HKLM:\Software\Microsoft\Windows\CurrentVersion\Policies\System\" -Name EnableLUA -Value 0
PS C:\Users\Administrator> Set-ItemProperty -Path "HKLM:\SOFTWARE\Microsoft\Active Setup\Installed Components\{A509B1A7-37EF-4b3f-8CFC-4F3A74704073}\" -Name "IsInstalled" -Value 0
PS C:\Users\Administrator> Set-ItemProperty -Path "HKLM:\SOFTWARE\Microsoft\Active Setup\Installed Components\{A509B1A8-37EF-4b3f-8CFC-4F3A74704073}\" -Name "IsInstalled" -Value 0
PS C:\Users\Administrator>
```

Figure 12 UAC Disabled

Server Manager

Server Manager ▶ Local Server

Dashboard

Local Server

All Servers

File and Storage Services ▶

PROPERTIES

For EarthKW

Computer name: EarthKW

Workgroup: WORKGROUP

Last installed updates: Never

Windows Update: Download updates c

Last checked for updates: Never

Microsoft Defender Firewall: Public: On

Remote management: Enabled

Remote Desktop: Disabled

NIC Teaming: Disabled

Ethernet0: 172.16.0.64, IPv6 enabled

Microsoft Defender Antivirus: Real-Time Protection

Feedback & Diagnostics: Settings

IE Enhanced Security Configuration: Off

Time zone: (UTC-05:00) Eastern

Product ID: Not activated

Operating system version: Microsoft Windows Server 2022 Datacenter Evaluation

Hardware information: VMware, Inc. VMWare20,1

Processors: AMD Ryzen 9 7900X

Installed memory (RAM): 2 GB

Total disk space: 59.37 GB

EVENTS

All events | 48 total

Filter

Server Name	ID	Severity	Source	Log	Date and Time
EARTHKW	8198	Error	Microsoft-Windows-Security-SPP	Application	10/31/2025 12:00:06 AM
EARTHKW	1014	Error	Microsoft-Windows-Security-SPP	Application	10/31/2025 12:00:06 AM
EARTHKW	8200	Error	Microsoft-Windows-Security-SPP	Application	10/31/2025 12:00:06 AM
EARTHKW	10016	Warning	Microsoft-Windows-DistributedCOM	System	10/31/2025 12:00:05 AM
EARTHKW	8198	Error	Microsoft-Windows-Security-SPP	Application	10/30/2025 11:55:48 PM
EARTHKW	8200	Error	Microsoft-Windows-Security-SPP	Application	10/30/2025 11:55:48 PM
EARTHKW	1014	Error	Microsoft-Windows-Security-SPP	Application	10/30/2025 11:55:48 PM

SERVICES

All services | 211 total

Type here to search

12:00 AM 10/31/2025

Figure 13 Server 1 "Local Server" page

Server 2:

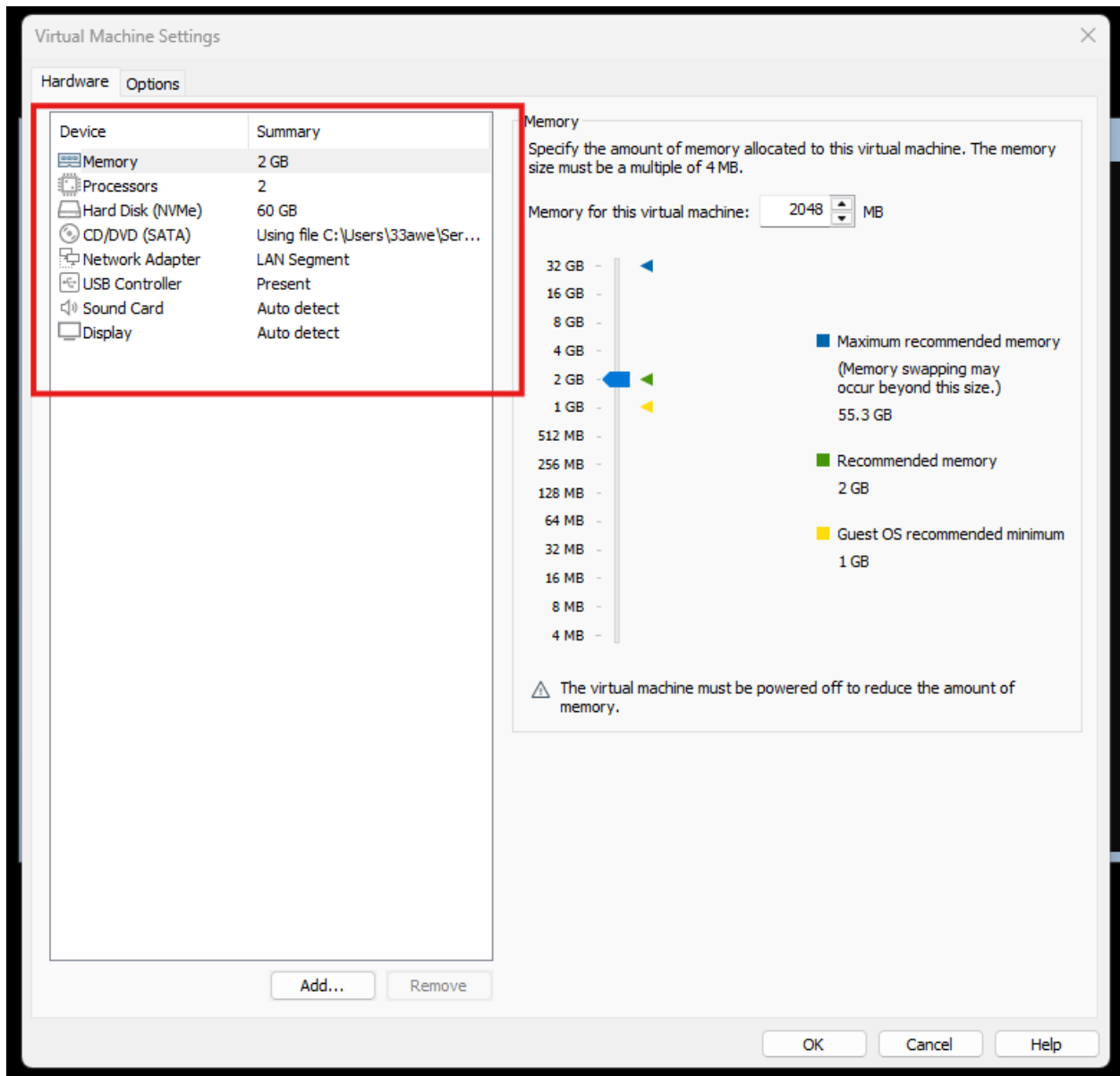


Figure 14 Server 2 Hardware

```
Administrator: C:\Windows\system32\cmd.exe
WARNING: To launch Server Configuration tool again, run "SConfig"
PS C:\Users\Administrator> Rename-Computer -NewName
Rename-Computer : Missing an argument for parameter 'NewName'. Specify a parameter of type 'System.String' and try
again.
At line:1 char:17
+ Rename-Computer -NewName
+ ~~~~~
+ CategoryInfo          : InvalidArgument: (:) [Rename-Computer], ParameterBindingException
+ FullyQualifiedErrorId : MissingArgument,Microsoft.PowerShell.Commands.RenameComputerCommand

PS C:\Users\Administrator> Rename-Computer -NewName "PlanetIrkKW"
>>
Rename-Computer : Skip computer 'WIN-SIJMD2DHS1B' with new name 'PlanetIrkKW
' because the new name is not valid. The new computer name entered is not properly formatted. Standard names may
contain letters (a-z, A-Z), numbers (0-9), and hyphens (-), but no spaces or periods (.). The name may not consist
entirely of digits, and may not be longer than 63 characters.
At line:1 char:1
+ Rename-Computer -NewName "PlanetIrkKW
+ ~~~~~
+ CategoryInfo          : InvalidArgument: (PlanetIrkKW
:String) [Rename-Computer], InvalidOperationException
+ FullyQualifiedErrorId : InvalidNewName,Microsoft.PowerShell.Commands.RenameComputerCommand

PS C:\Users\Administrator> Rename-Computer -NewName "PlanetIrkKW"
WARNING: The changes will take effect after you restart the computer WIN-SIJMD2DHS1B.
PS C:\Users\Administrator>
```

Figure 15 Server 2 being named

```
Administrator: C:\Windows\system32\cmd.exe
WARNING: To launch Server Configuration tool again, run "SConfig"
PS C:\Users\Administrator> Rename-Computer -NewName
Rename-Computer : Missing an argument for parameter 'NewName'. Specify a parameter of type 'System.String' and try
again.
At line:1 char:17
+ Rename-Computer -NewName
+ ~~~~~
+ CategoryInfo          : InvalidArgument: (:) [Rename-Computer], ParameterBindingException
+ FullyQualifiedErrorId : MissingArgument,Microsoft.PowerShell.Commands.RenameComputerCommand

PS C:\Users\Administrator> Rename-Computer -NewName "PlanetIrkKW"
>>
Rename-Computer : Skip computer 'WIN-SIJMD2DHS1B' with new name 'PlanetIrkKW
' because the new name is not valid. The new computer name entered is not properly formatted. Standard names may
contain letters (a-z, A-Z), numbers (0-9), and hyphens (-), but no spaces or periods (.). The name may not consist
entirely of digits, and may not be longer than 63 characters.
At line:1 char:1
+ Rename-Computer -NewName "PlanetIrkKW
+ ~~~~~
+ CategoryInfo          : InvalidArgument: (PlanetIrkKW
:String) [Rename-Computer], InvalidOperationException
+ FullyQualifiedErrorId : InvalidNewName,Microsoft.PowerShell.Commands.RenameComputerCommand

PS C:\Users\Administrator> Rename-Computer -NewName "PlanetIrkKW"
WARNING: The changes will take effect after you restart the computer WIN-SIJMD2DHS1B.
PS C:\Users\Administrator> Set-Timezone -ID "Eastern Standard Time"
PS C:\Users\Administrator>
```

Figure 16 Server 2 Timezone being set

```
Administrator: C:\Windows\system32\cmd.exe
PS C:\Users\Administrator> PowerCFG /L

Existing Power Schemes (* Active)
-----
Power Scheme GUID: 381b4222-f694-41f0-9685-ff5bb260df2e (Balanced) *
Power Scheme GUID: 8c5e7fda-e8bf-4a96-9a85-a6e23a8c635c (High performance)
Power Scheme GUID: a1841308-3541-4fab-bc81-f71556f20b4a (Power saver)
PS C:\Users\Administrator> PowerCFG /change monitor-timeout-ac 0
PS C:\Users\Administrator> PowerCFG /change monitor-timeout-dc 0
PS C:\Users\Administrator>
```

Figure 17 Server 2 sleep being disabled

```
Administrator: C:\Windows\system32\cmd.exe
PS C:\Users\Administrator> Get-NetAdapter

Name                InterfaceDescription          ifIndex Status      MacAddress      LinkSpeed
----                -
Ethernet0           Intel(R) 82574L Gigabit Network Conn... 4 Up           00-0C-29-38-32-FB 1 Gbps

PS C:\Users\Administrator> Set-NetIPInterface -InterfaceAlias "Ethernet0" -DHCP Disable -Passthru

ifIndex InterfaceAlias      AddressFamily NlMtu(Bytes) InterfaceMetric Dhcp      ConnectionState PolicyStore
-----
4        Ethernet0             IPv6          1500         25 Disabled Connected      ActiveStore
4        Ethernet0             IPv4          1500         25 Disabled Connected      ActiveStore

PS C:\Users\Administrator>
```

Figure 18 Server 2 DHCP being disabled

```
Administrator: C:\Windows\system32\cmd.exe
PS C:\Users\Administrator> New-NetIPAddress -AddressFamily IPV4 -InterfaceAlias "Ethernet0" -IPAddress 172.16.0.65 -PrefixLength 24

IPAddress      : 172.16.0.65
InterfaceIndex : 4
InterfaceAlias : Ethernet0
AddressFamily  : IPv4
Type           : Unicast
PrefixLength   : 24
PrefixOrigin   : Manual
SuffixOrigin   : Manual
AddressState   : Tentative
ValidLifetime  : Infinite ([TimeSpan]::MaxValue)
PreferredLifetime : Infinite ([TimeSpan]::MaxValue)
SkipAsSource   : False
PolicyStore    : ActiveStore

IPAddress      : 172.16.0.65
InterfaceIndex : 4
InterfaceAlias : Ethernet0
AddressFamily  : IPv4
Type           : Unicast
PrefixLength   : 24
PrefixOrigin   : Manual
SuffixOrigin   : Manual
AddressState   : Invalid
ValidLifetime  : Infinite ([TimeSpan]::MaxValue)
PreferredLifetime : Infinite ([TimeSpan]::MaxValue)
```

Figure 19 Server 2 Static IP being configured

```
Administrator: C:\Windows\system32\cmd.exe
SuffixOrigin    : Manual
AddressState    : Tentative
ValidLifetime   : Infinite ([TimeSpan]::MaxValue)
PreferredLifetime : Infinite ([TimeSpan]::MaxValue)
SkipAsSource    : False
PolicyStore     : ActiveStore

IPAddress      : 172.16.0.65
InterfaceIndex : 4
InterfaceAlias : Ethernet0
AddressFamily  : IPv4
Type           : Unicast
PrefixLength   : 24
PrefixOrigin   : Manual
SuffixOrigin   : Manual
AddressState   : Invalid
ValidLifetime  : Infinite ([TimeSpan]::MaxValue)
PreferredLifetime : Infinite ([TimeSpan]::MaxValue)
SkipAsSource   : False
PolicyStore    : PersistentStore

PS C:\Users\Administrator> Set-DNSClientServerAddress -InterfaceAlias "Ethernet0" -ServerAddress 172.16.0.65
PS C:\Users\Administrator>
```

Figure 20 Server 2 DNS being configured

```
Administrator: C:\Windows\system32\cmd.exe
PrefixLength      : 24
PrefixOrigin      : Manual
SuffixOrigin      : Manual
AddressState      : Invalid
ValidLifetime     : Infinite ([TimeSpan]::MaxValue)
PreferredLifetime : Infinite ([TimeSpan]::MaxValue)
SkipAsSource      : False
PolicyStore       : PersistentStore

PS C:\Users\Administrator> Set-DNSClientServerAddress -InterfaceAlias "Ethernet0" -ServerAddress 172.16.0.65
PS C:\Users\Administrator> Set-ItemProperty -Path "HKLM:\SOFTWARE\Microsoft\Windows\CurrentVersion\Policies\System\" -Name "EnableLUA" -Value 0
PS C:\Users\Administrator>
```

Figure 21 Server 2 UAC being disabled

```
Administrator: C:\Windows\system32\cmd.exe
WARNING: To stop SConfig from launching at sign-in, type "Set-SConfig -AutoLaunch $false"

=====
Welcome to Windows Server 2022 Datacenter Evaluation
=====

1) Domain/workgroup:          Workgroup: WORKGROUP
2) Computer name:            PLANETIRKKW
3) Add local administrator
4) Remote management:        Enabled
5) Update setting:           Download only
6) Install updates
7) Remote desktop:           Disabled

8) Network settings
9) Date and time
10) Telemetry setting:        Required
11) Windows activation

12) Log off user
13) Restart server
14) Shut down server
15) Exit to command line (PowerShell)

Enter number to select an option: _
```

Figure 22 Server 2 sconfig

Server 3:

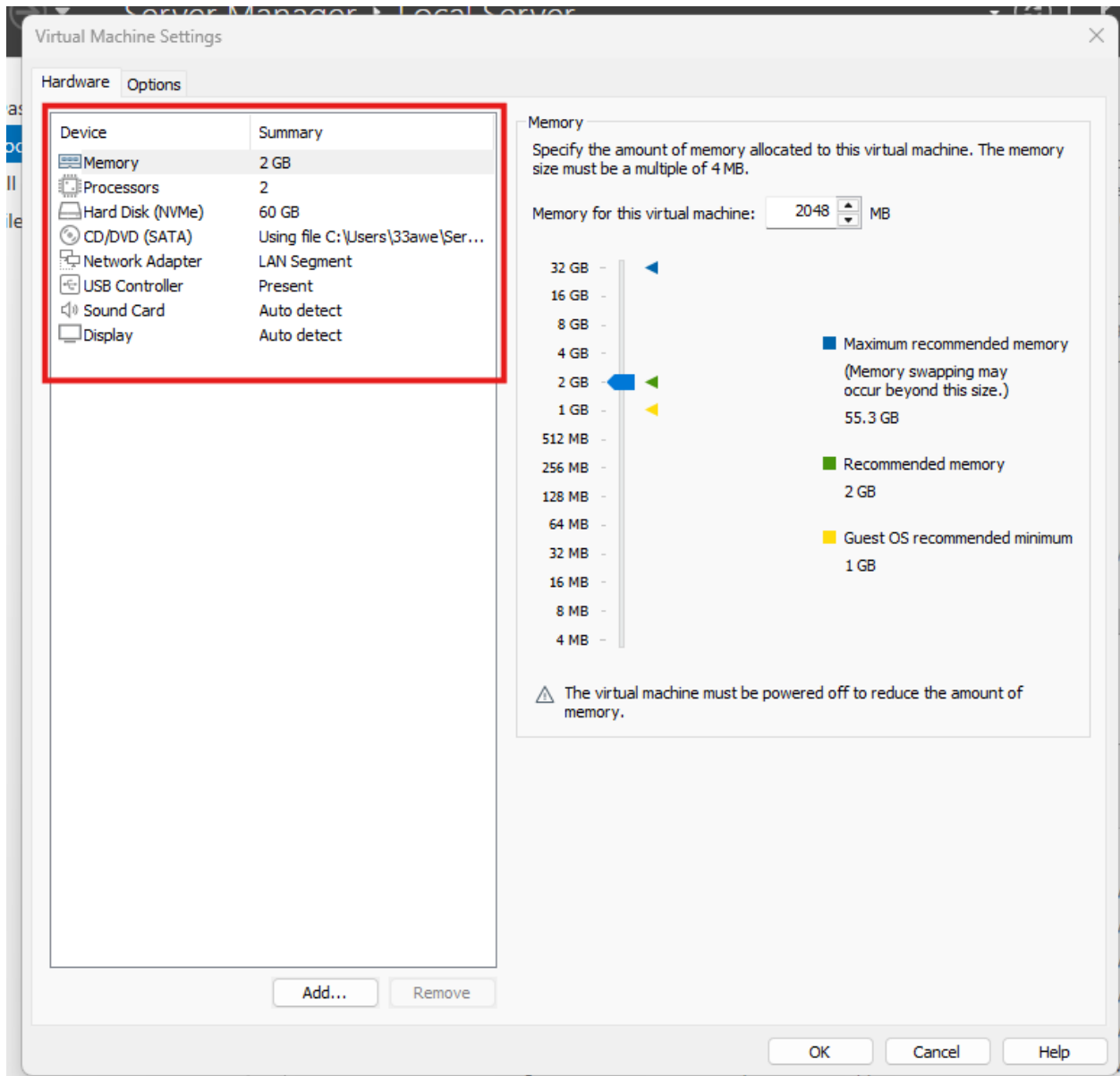


Figure 23 Server 3 Hardware Settings

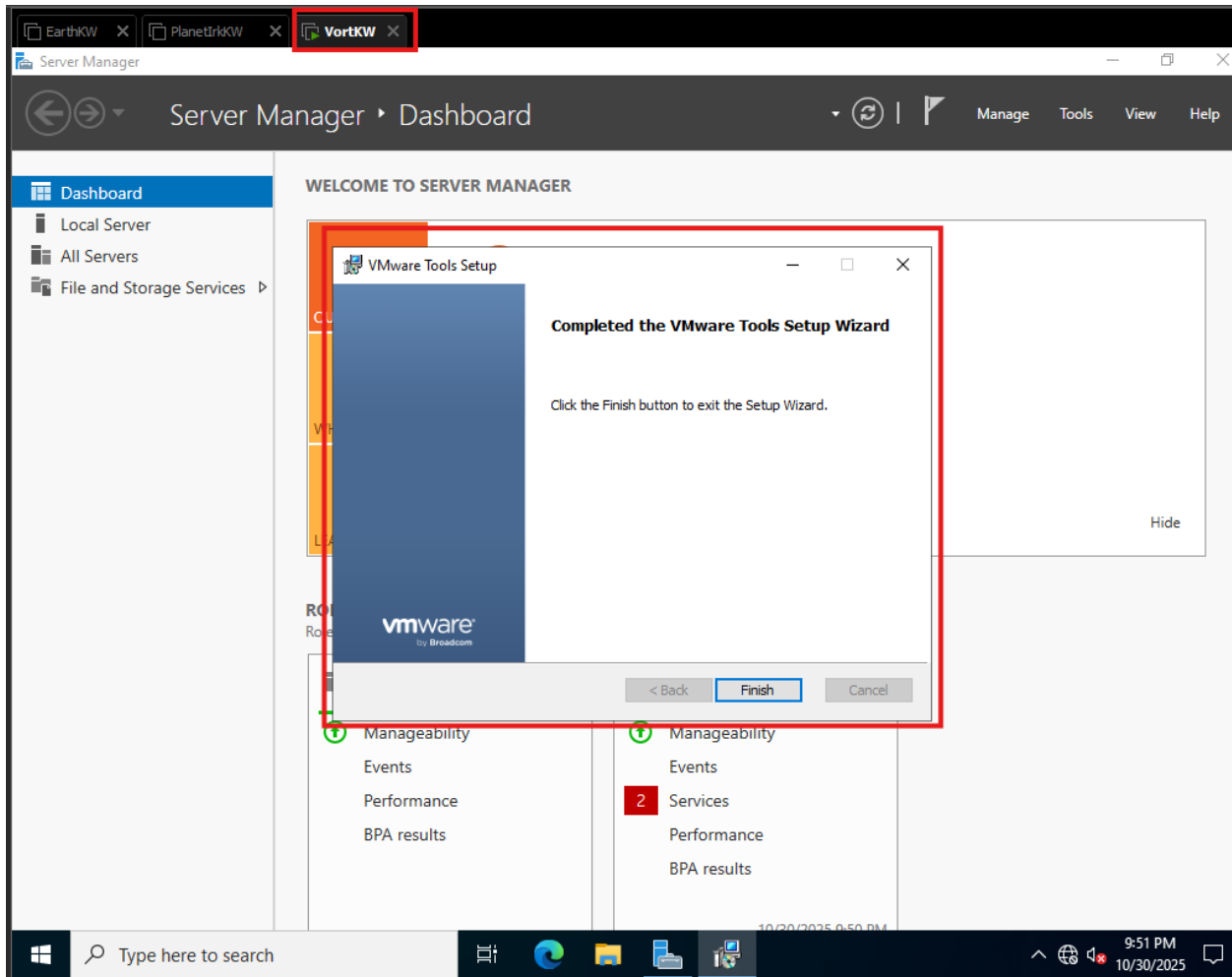


Figure 24 Server 2 VMWare Tools set up

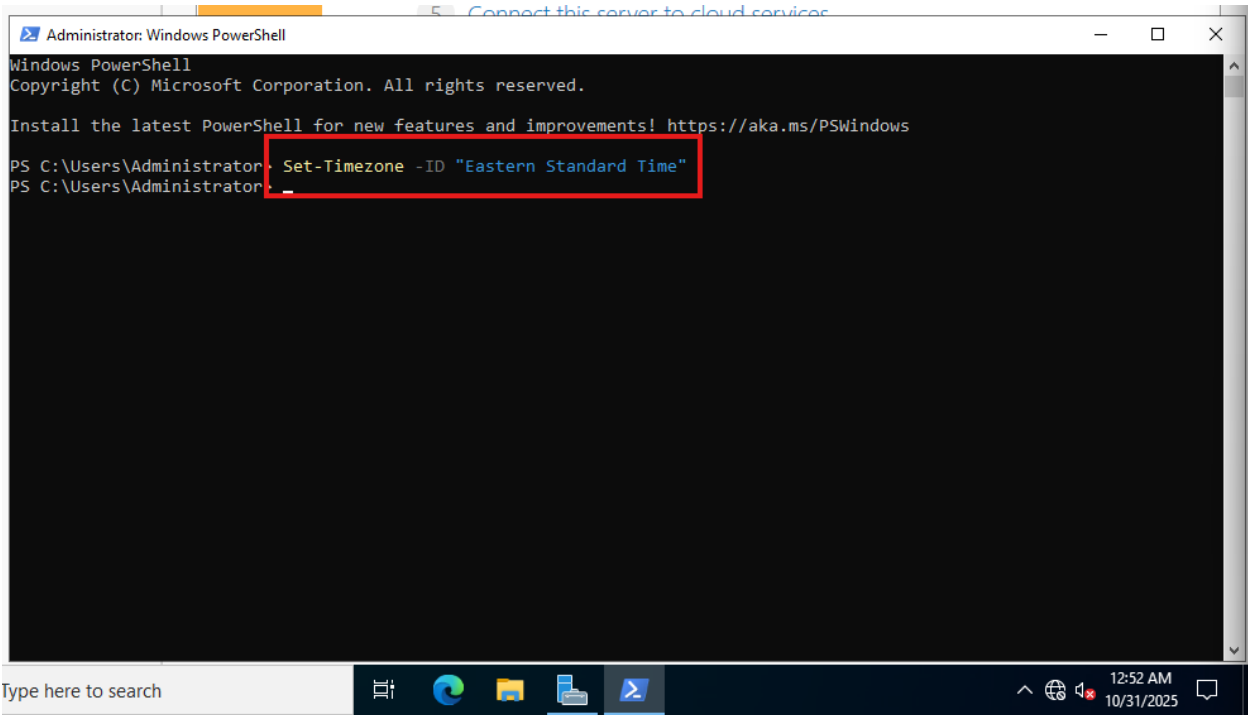


Figure 25 Server 3 Timezone

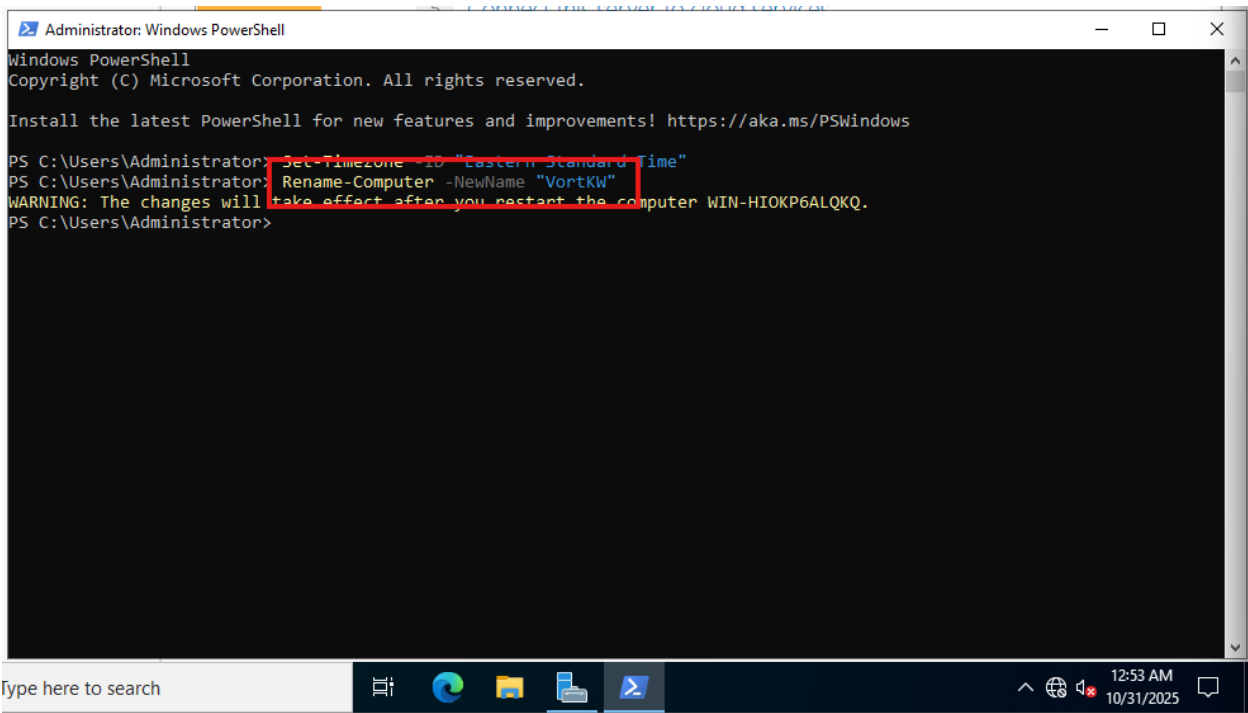


Figure 26 Server 3 computer name

```

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

Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\Users\Administrator> Set-Timezone -ID "Eastern Standard Time"
PS C:\Users\Administrator> Rename-Computer -NewName "VortKW"
WARNING: The changes will take effect after you restart the computer WIN-HIOKP6ALQKQ.
PS C:\Users\Administrator> PowerCFG /L

Existing Power Schemes (* Active)
-----
Power Scheme GUID: 381b4222-f694-41f0-9685-ff5bb260df2e (Balanced) *
Power Scheme GUID: 8c5e7fda-e8bf-4a96-9a85-a6e23a8c635c (High performance)
Power Scheme GUID: a1841308-3541-4fab-bc81-f71556f20b4a (Power saver)
PS C:\Users\Administrator> PowerCFG /change monitor-timeout-ac 0
PS C:\Users\Administrator> PowerCFG /change monitor-timeout-dc 0
PS C:\Users\Administrator>
  
```

Figure 27 Server 3 sleep being disabled

```

Administrator: Windows PowerShell
PS C:\Users\Administrator> Get-NetAdapter

Name                InterfaceDescription          ifIndex Status    MacAddress          LinkSpeed
-----                -
Ethernet0           Intel(R) 82574L Gigabit Network Conn... 5 Up        00-0C-29-81-D4-D1 1 Gbps

PS C:\Users\Administrator> Set-NetIPInterface -InterfaceAlias "Ethernet0" -DHCP Disabled -Passthru

ifIndex InterfaceAlias      AddressFamily NlMtu(Bytes) InterfaceMetric Dhcp    ConnectionState PolicyStore
-----                -
5        Ethernet0             IPv4          1500         25 Disabled Connected ActiveStore
5        Ethernet0             IPv6          1500         25 Disabled Connected ActiveStore

PS C:\Users\Administrator>
  
```

Figure 28 Server 3 DHCP being disabled

```
Administrator: Windows PowerShell
PS C:\Users\Administrator> New-NetIPAddress -AddressFamily IPV4 -InterfaceAlias "Ethernet0" -IPAddress 172.16.0.66 -PrefixLength 24

IPAddress      : 172.16.0.66
InterfaceIndex : 5
InterfaceAlias : Ethernet0
AddressFamily  : IPv4
Type           : Unicast
PrefixLength   : 24
PrefixOrigin   : Manual
SuffixOrigin   : Manual
AddressState   : Tentative
ValidLifetime  : Infinite ([TimeSpan]::MaxValue)
PreferredLifetime : Infinite ([TimeSpan]::MaxValue)
SkipAsSource   : False
PolicyStore    : ActiveStore

IPAddress      : 172.16.0.66
InterfaceIndex : 5
InterfaceAlias : Ethernet0
AddressFamily  : IPv4
Type           : Unicast
PrefixLength   : 24
PrefixOrigin   : Manual
SuffixOrigin   : Manual
AddressState   : Invalid
ValidLifetime  : Infinite ([TimeSpan]::MaxValue)
PreferredLifetime : Infinite ([TimeSpan]::MaxValue)
SkipAsSource   : False
PolicyStore    : ActiveStore
```

Figure 29 Server 3 Static IP being set

```
Administrator: Windows PowerShell
AddressState    : Tentative
ValidLifetime   : Infinite ([TimeSpan]::MaxValue)
PreferredLifetime : Infinite ([TimeSpan]::MaxValue)
SkipAsSource    : False
PolicyStore     : ActiveStore

IPAddress      : 172.16.0.66
InterfaceIndex : 5
InterfaceAlias : Ethernet0
AddressFamily  : IPv4
Type           : Unicast
PrefixLength   : 24
PrefixOrigin   : Manual
SuffixOrigin   : Manual
AddressState   : Invalid
ValidLifetime  : Infinite ([TimeSpan]::MaxValue)
PreferredLifetime : Infinite ([TimeSpan]::MaxValue)
SkipAsSource   : False
PolicyStore    : PersistentStore

PS C:\Users\Administrator> Set-DNSClientServerAddress -InterfaceAlias "Ethernet0" -ServerAddresses 172.16.0.64
PS C:\Users\Administrator>
```

Figure 30 Server 3 Static IP cont'd / DNS being set

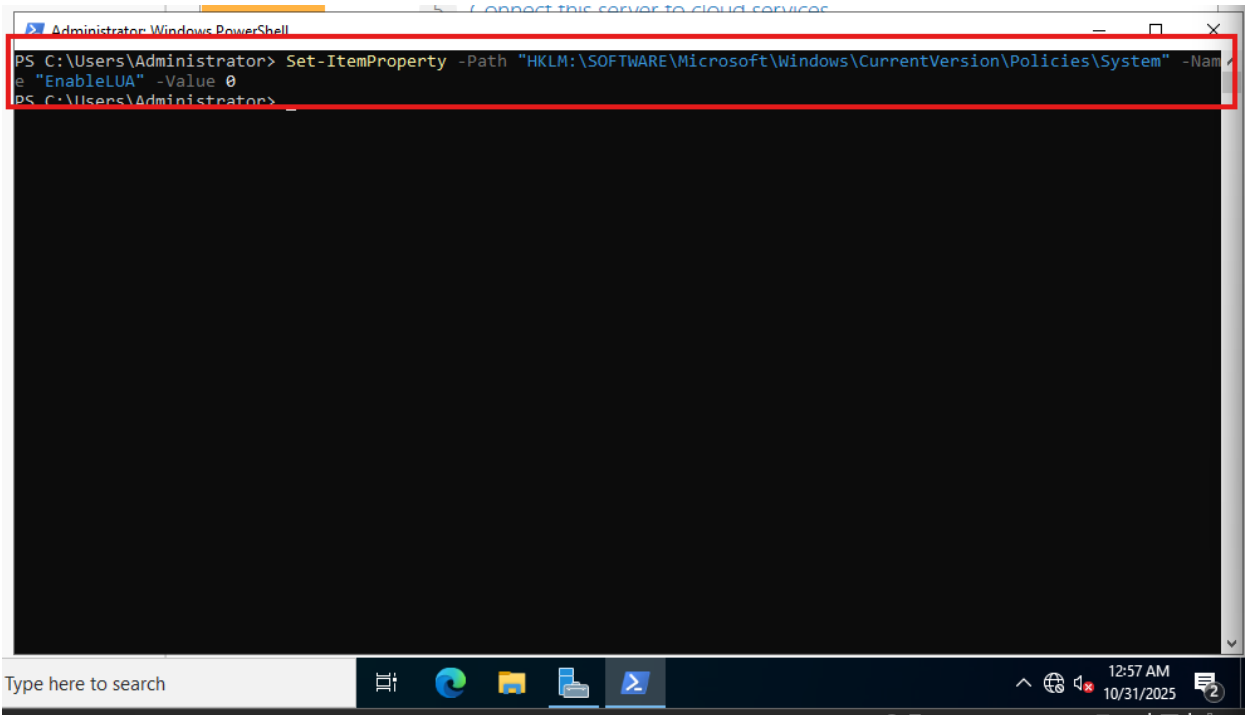


Figure 31 Server 3 UAC being disabled

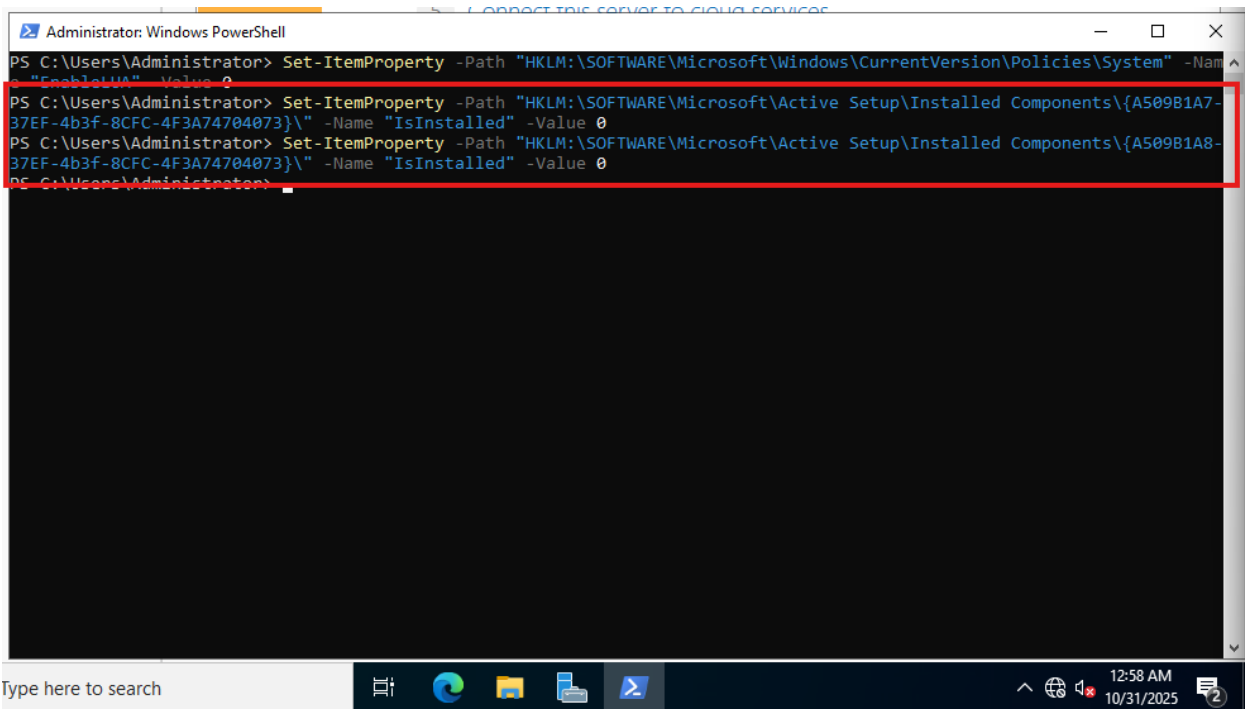


Figure 32 Server 3 UAC being disabled

The screenshot displays the Windows Server Manager interface for a local server named 'VortKW'. The left-hand navigation pane shows 'Local Server' selected. The main area is divided into three sections: PROPERTIES, EVENTS, and SERVICES.

PROPERTIES (For VortKW):

- Computer name: VortKW
- Workgroup: WORKGROUP
- Microsoft Defender Firewall: Public: On
- Remote management: Enabled
- Remote Desktop: Disabled
- NIC Teaming: Disabled
- Ethernet0: 172.16.0.66, IPv6 enabled
- Last installed updates: Never
- Windows Update: Download updates c
- Last checked for updates: Never
- Microsoft Defender Antivirus: Real-Time Protection
- Feedback & Diagnostics: Settings
- IE Enhanced Security Configuration: Off
- Time zone: (UTC-05:00) Eastern
- Product ID: Not activated
- Operating system version: Microsoft Windows Server 2022 Datacenter Evaluation
- Hardware information: VMware, Inc. VMware20,1
- Processors: AMD Ryzen 9 7900X
- Installed memory (RAM): 2 GB
- Total disk space: 59.37 GB

EVENTS (All events | 43 total):

Server Name	ID	Severity	Source	Log	Date and Time
VORTKW	10016	Warning	Microsoft-Windows-DistributedCOM	System	10/31/2025 1:00:35 AM
VORTKW	134	Warning	Microsoft-Windows-Time-Service	System	10/31/2025 1:00:24 AM
VORTKW	8198	Error	Microsoft-Windows-Security-SPP	Application	10/31/2025 1:00:24 AM
VORTKW	1014	Error	Microsoft-Windows-Security-SPP	Application	10/31/2025 1:00:24 AM
VORTKW	8200	Error	Microsoft-Windows-Security-SPP	Application	10/31/2025 1:00:24 AM
VORTKW	4440	Warning	Microsoft-Windows-Complu	Application	10/31/2025 1:00:23 AM
VORTKW	134	Warning	Microsoft-Windows-Time-Service	System	10/31/2025 1:00:22 AM

SERVICES (All services | 211 total):

Figure 33 Server 3 "Local Server" page

Server 1 Configuration:

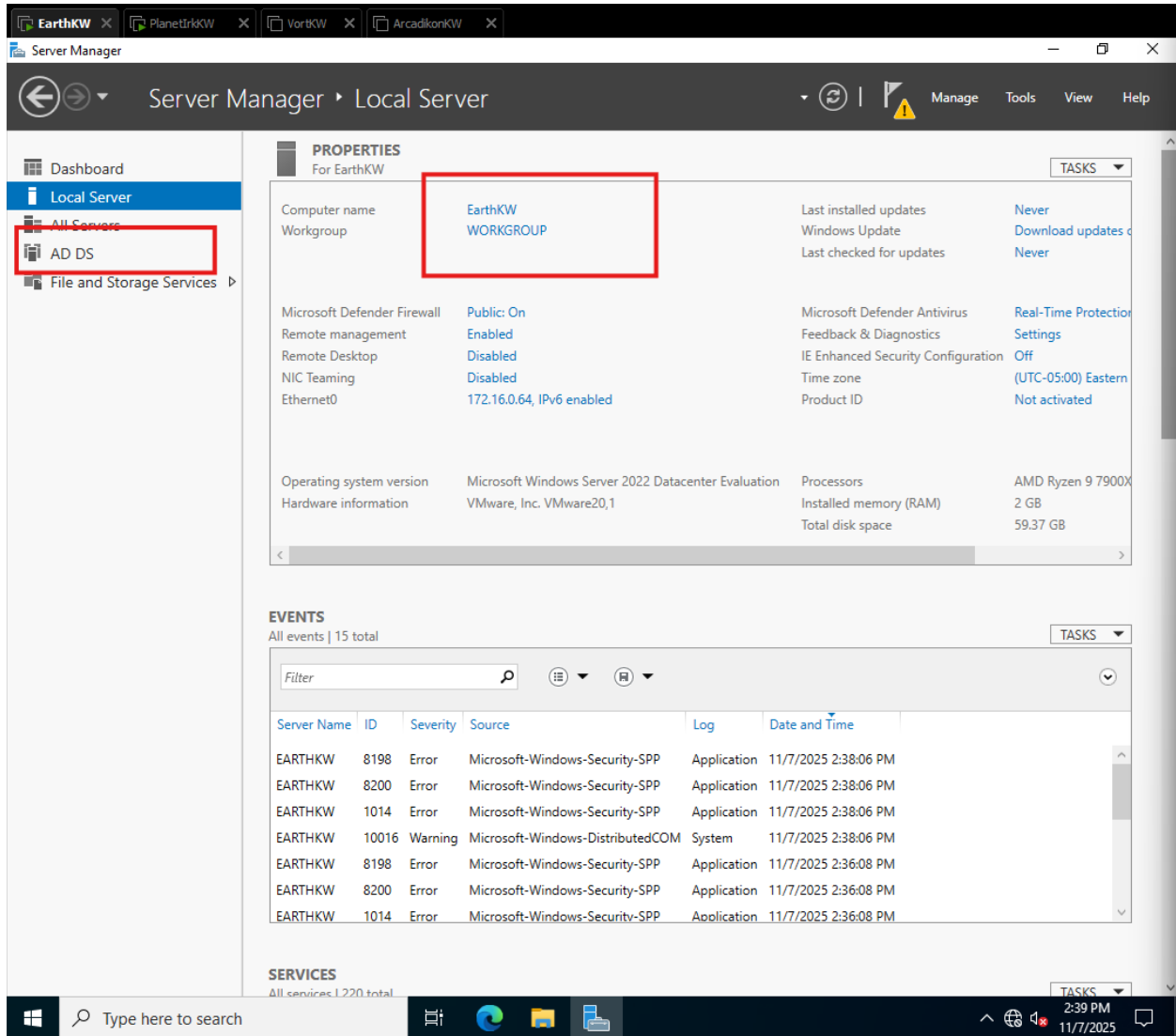


Figure 34 Server 1 ADDS installed

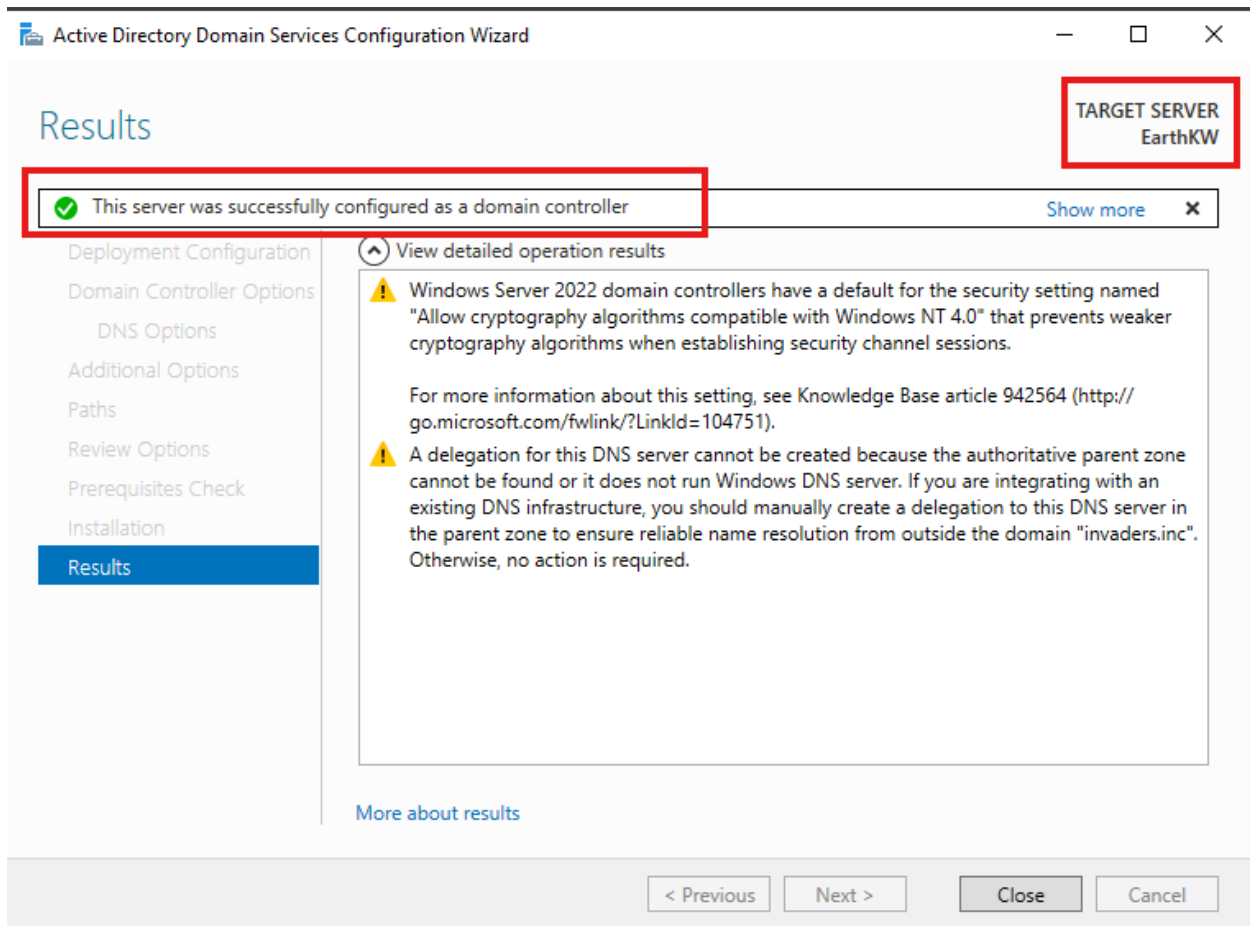


Figure 35 Server 1 set as domain controller

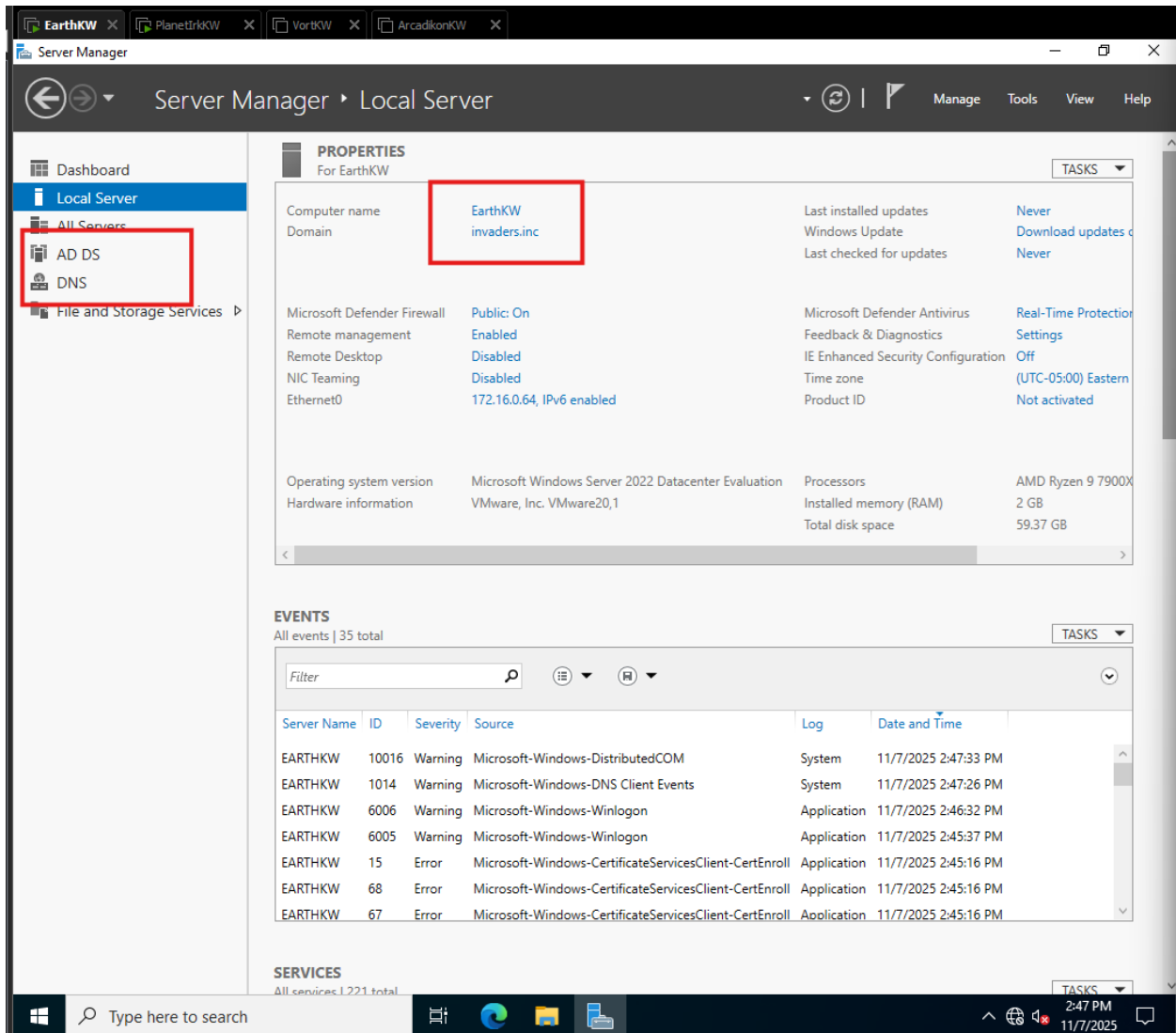
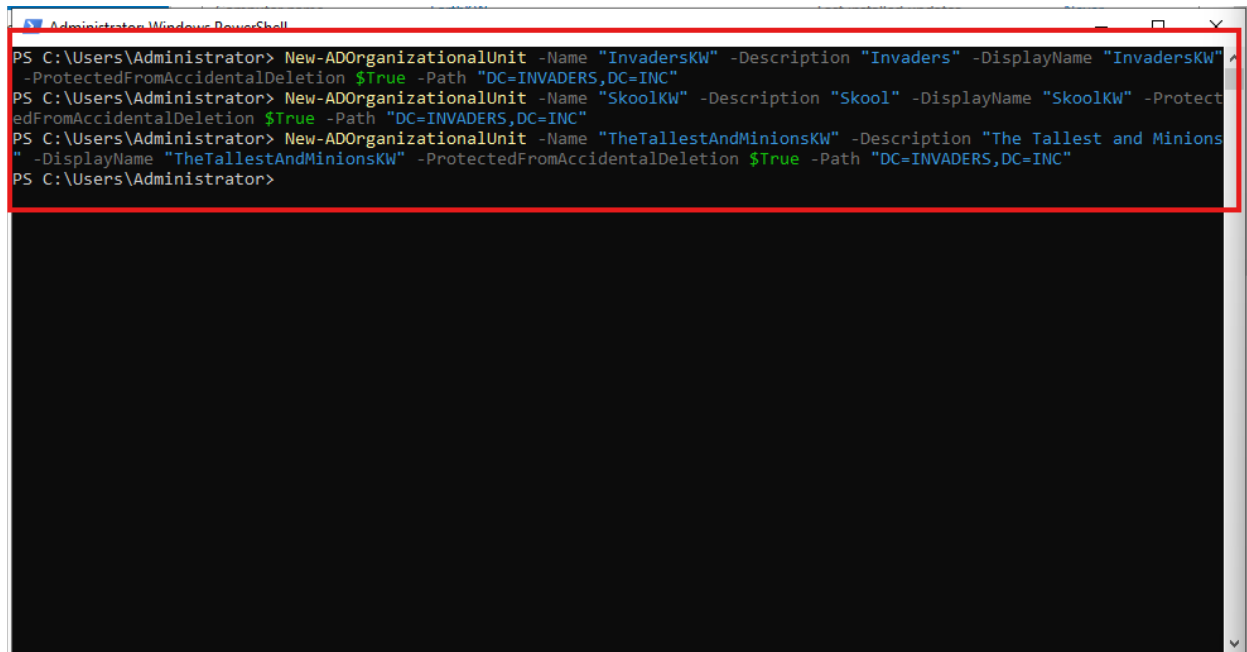


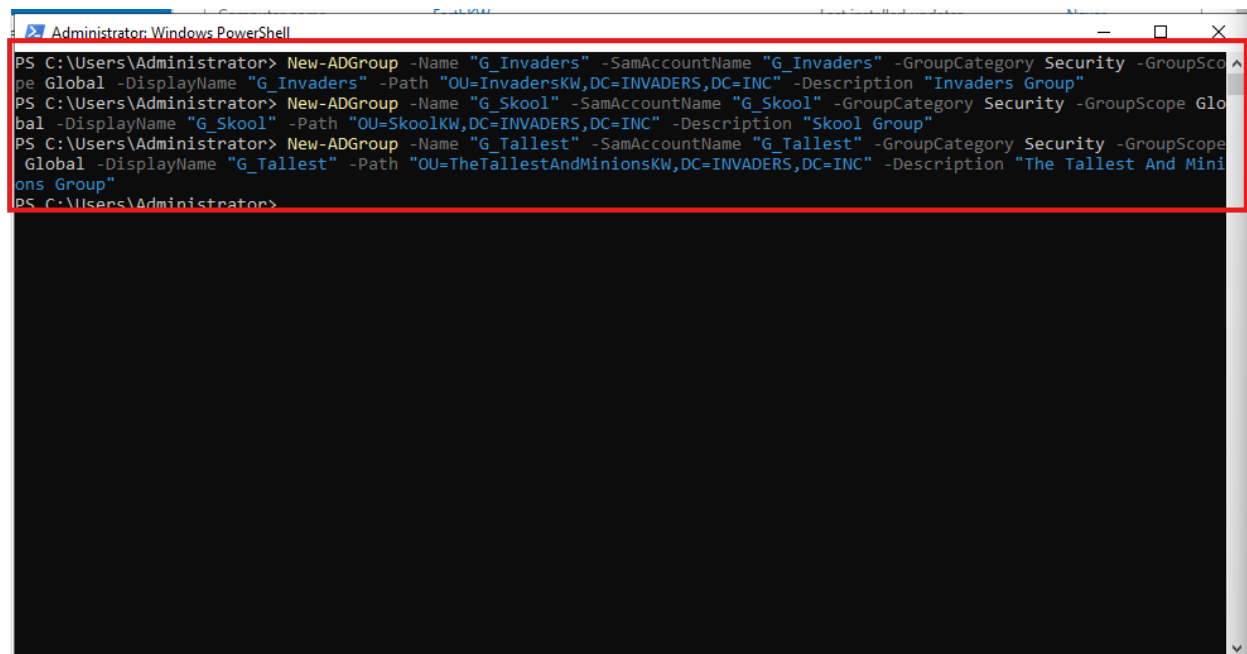
Figure 36 Server 1 successfully configured as DC of invaders.inc

Organizational Units and Users:



```
Administrator: Windows PowerShell
PS C:\Users\Administrator> New-ADOrganizationalUnit -Name "InvadersKW" -Description "Invaders" -DisplayName "InvadersKW" -ProtectedFromAccidentalDeletion $True -Path "DC=INVADERS,DC=INC"
PS C:\Users\Administrator> New-ADOrganizationalUnit -Name "SkoolKW" -Description "Skool" -DisplayName "SkoolKW" -ProtectedFromAccidentalDeletion $True -Path "DC=INVADERS,DC=INC"
PS C:\Users\Administrator> New-ADOrganizationalUnit -Name "TheTallestAndMinionsKW" -Description "The Tallest and Minions" -DisplayName "TheTallestAndMinionsKW" -ProtectedFromAccidentalDeletion $True -Path "DC=INVADERS,DC=INC"
PS C:\Users\Administrator>
```

Figure 37 Configuring OUs on Server 1



```
Administrator: Windows PowerShell
PS C:\Users\Administrator> New-ADGroup -Name "G_Invaders" -SamAccountName "G_Invaders" -GroupCategory Security -GroupScope Global -DisplayName "G_Invaders" -Path "OU=InvadersKW,DC=INVADERS,DC=INC" -Description "Invaders Group"
PS C:\Users\Administrator> New-ADGroup -Name "G_Skool" -SamAccountName "G_Skool" -GroupCategory Security -GroupScope Global -DisplayName "G_Skool" -Path "OU=SkoolKW,DC=INVADERS,DC=INC" -Description "Skool Group"
PS C:\Users\Administrator> New-ADGroup -Name "G_Tallest" -SamAccountName "G_Tallest" -GroupCategory Security -GroupScope Global -DisplayName "G_Tallest" -Path "OU=TheTallestAndMinionsKW,DC=INVADERS,DC=INC" -Description "The Tallest And Minions Group"
PS C:\Users\Administrator>
```

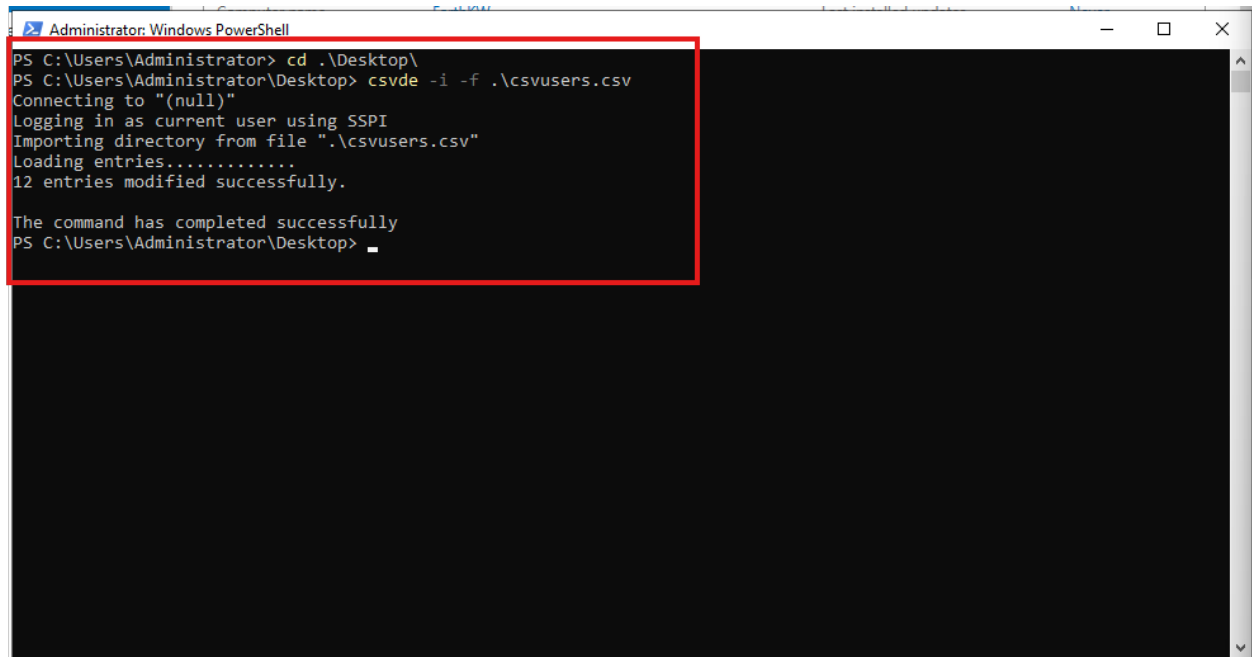
Figure 38 Setting up security groups on Server 1



The screenshot shows a Notepad window titled "csvusers.csv - Notepad". The window contains a list of user configurations in CSV format. Each line represents a user entry with fields for dn, SamAccountName, UserPrincipalName, and objectClass. The users listed include Zim, Gir, Robot Parent Dad, Robot Parent Mom, Skool Principal, Ms. Bitter, Keef, Meef, Purple, Red, Sizz-Lorr, and Skoodge.

```
dn,SamAccountName,UserPrincipalName,objectClass
"cn=Zim,ou=InvadersKW,dc=invaders,dc=inc",zim,zim@invaders.inc,user
"cn=Gir,ou=InvadersKW,dc=invaders,dc=inc",Gir,gir@invaders.inc,user
"cn=Robot Parent Dad,ou=InvadersKW,dc=invaders,dc=inc",dad,dad@invaders.inc,user
"cn=Robot Parent Mom,ou=InvadersKW,dc=invaders,dc=inc",mom,mom@invaders.inc,user
"cn=Skool Principal,ou=SkoolKW,dc=invaders,dc=inc",principal,principal@invaders.inc,user
"cn=Ms. Bitter,ou=SkoolKW,dc=invaders,dc=inc",bitters,bitters@invaders.inc,user
"cn=Keef,ou=SkoolKW,dc=invaders,dc=inc",keef,keef@invaders.inc,user
"cn=Meef,ou=SkoolKW,dc=invaders,dc=inc",meef,meef@invaders.inc,user
"cn=Purple,ou=TheTallestAndMinionsKW,dc=invaders,dc=inc",purple,purple@invaders.inc,user
"cn=Red,ou=TheTallestAndMinionsKW,dc=invaders,dc=inc",red,red@invaders.inc,user
"cn=Sizz-Lorr,ou=TheTallestAndMinionsKW,dc=invaders,dc=inc",sizz,sizz@invaders.inc,user
"cn=Skoodge,ou=TheTallestAndMinionsKW,dc=invaders,dc=inc",skoodge,skoodge@invaders.inc,user
```

Figure 39 CSV file with user configurations



The screenshot shows an Administrator Windows PowerShell window. The user has navigated to the Desktop directory and executed the command "csvde -i -f .\csvusers.csv". The output shows that the command was successful, with 12 entries imported from the CSV file.

```
Administrator: Windows PowerShell
PS C:\Users\Administrator> cd .\Desktop\
PS C:\Users\Administrator\Desktop> csvde -i -f .\csvusers.csv
Connecting to "(null)"
Logging in as current user using SSPI
Importing directory from file ".\csvusers.csv"
Loading entries.....
12 entries modified successfully.

The command has completed successfully
PS C:\Users\Administrator\Desktop> _
```

Figure 40 Importing CSV file

```

Administrator: Windows PowerShell
PS C:\Users\Administrator\Desktop> dsquery user "OU=InvadersKW,DC=invaders,dc=inc" -limit 0 | DSMOD user -pwd Password01 -disabled no -mustchpwd no -pwdneverexpires yes
dsmod succeeded: CN=Zim,OU=InvadersKW,DC=invaders,DC=inc
dsmod succeeded: CN=Gir,OU=InvadersKW,DC=invaders,DC=inc
dsmod succeeded: CN=Robot Parent Dad,OU=InvadersKW,DC=invaders,DC=inc
dsmod succeeded: CN=Robot Parent Mom,OU=InvadersKW,DC=invaders,DC=inc
PS C:\Users\Administrator\Desktop> dsquery user "OU=SkoolKW,DC=invaders,dc=inc" -limit 0 | DSMOD user -pwd Password01 -disabled no -mustchpwd no -pwdneverexpires yes
dsmod succeeded: CN=Skool Principal,OU=SkoolKW,DC=invaders,DC=inc
dsmod succeeded: CN=Ms.Bitter,OU=SkoolKW,DC=invaders,DC=inc
dsmod succeeded: CN=Keef,OU=SkoolKW,DC=invaders,DC=inc
dsmod succeeded: CN=Meeff,OU=SkoolKW,DC=invaders,DC=inc
PS C:\Users\Administrator\Desktop> dsquery user "OU=TheTallestAndMinionsKW,DC=invaders,dc=inc" -limit 0 | DSMOD user -pwd Password01 -disabled no -mustchpwd no -pwdneverexpires yes
dsmod succeeded: CN=Purple,OU=TheTallestAndMinionsKW,DC=invaders,DC=inc
dsmod succeeded: CN=Red,OU=TheTallestAndMinionsKW,DC=invaders,DC=inc
dsmod succeeded: CN=Sizz-Lorr,OU=TheTallestAndMinionsKW,DC=invaders,DC=inc
dsmod succeeded: CN=Skoodge,OU=TheTallestAndMinionsKW,DC=invaders,DC=inc
PS C:\Users\Administrator\Desktop>

```

Figure 41 Proving successful import

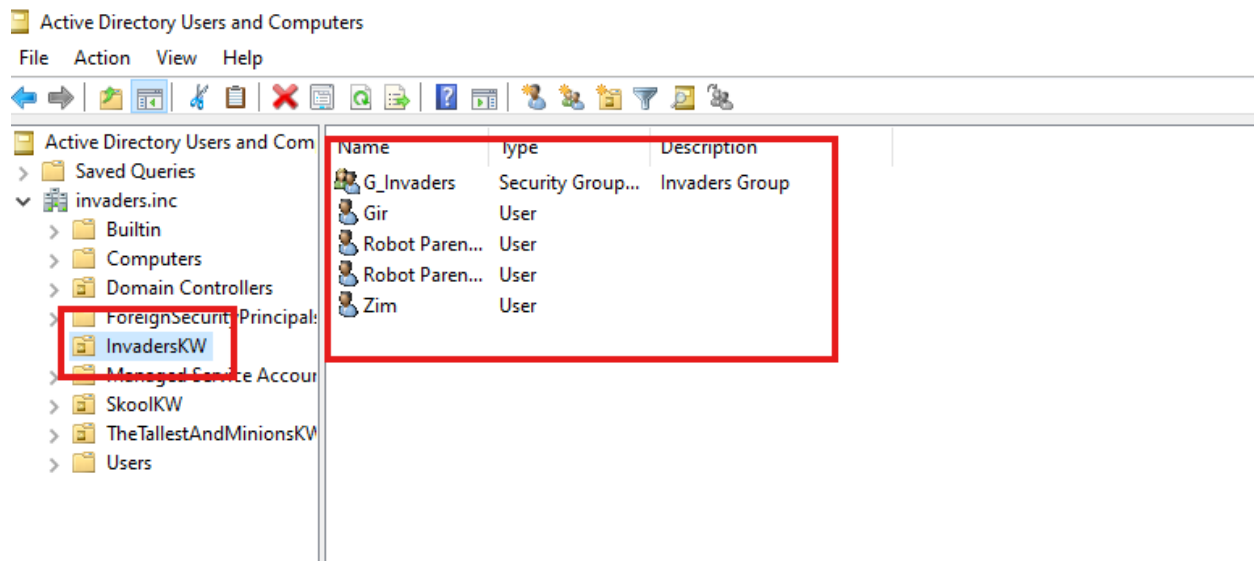


Figure 42 Proving InvadersKW import

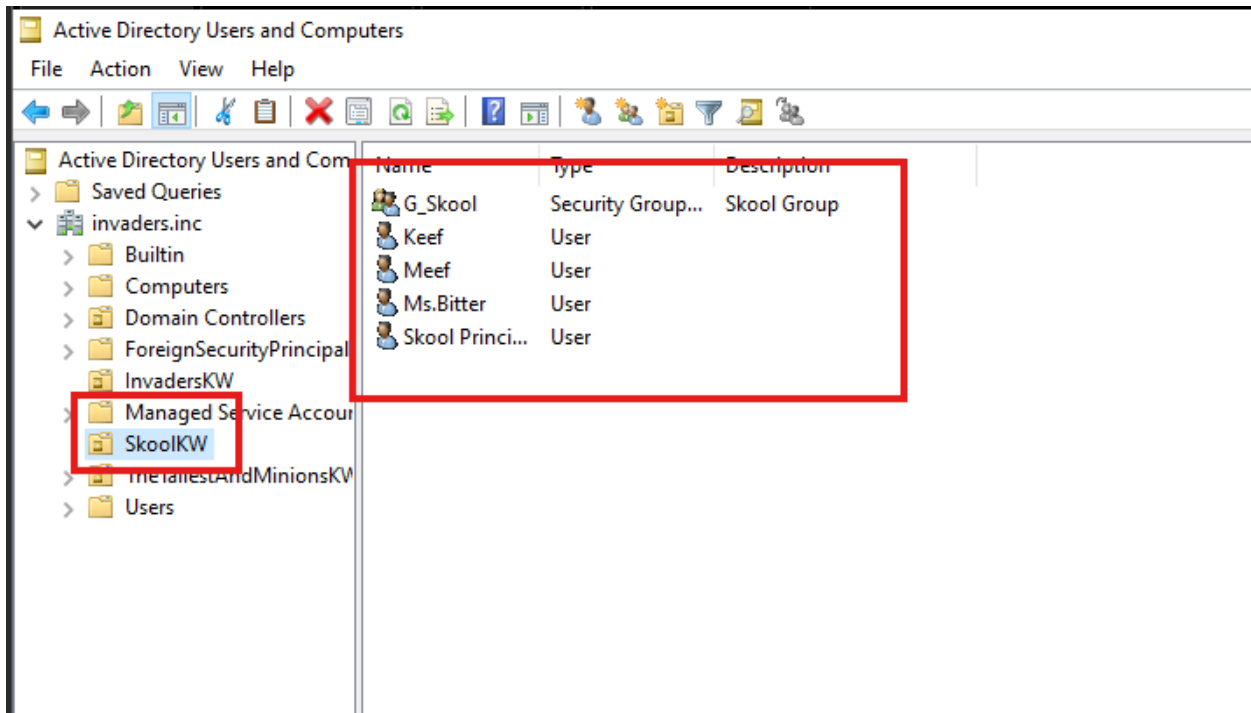


Figure 43 Proving SkoolKW import

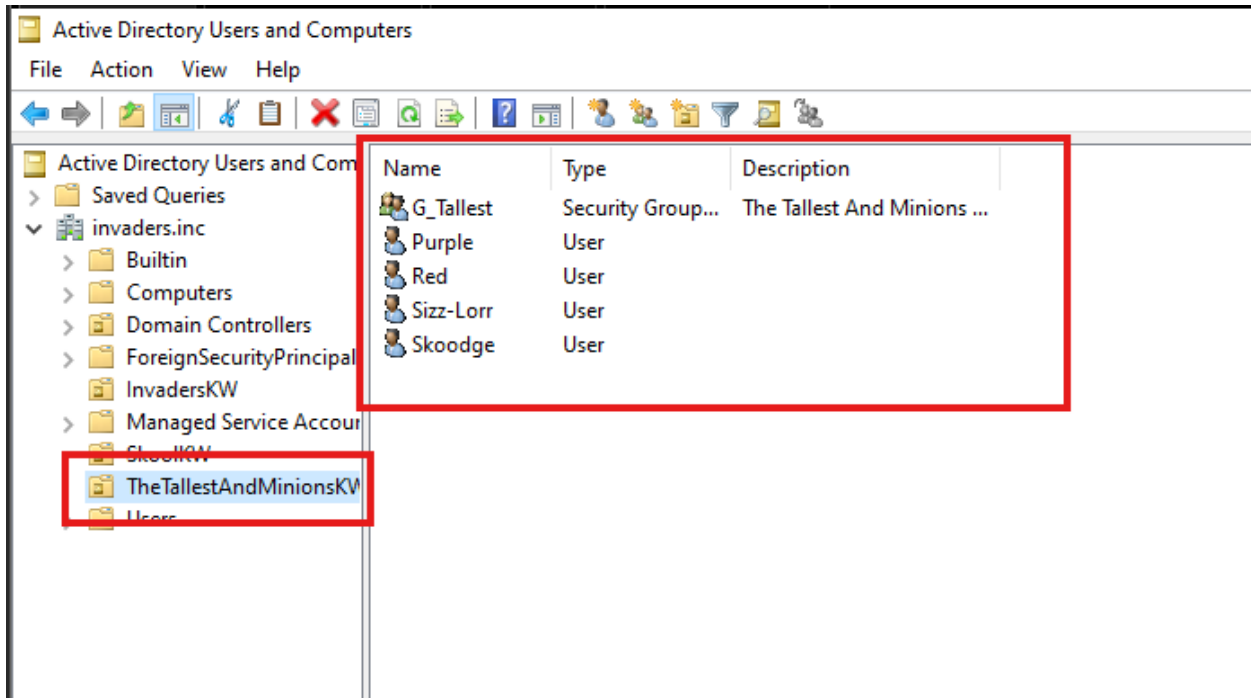


Figure 44 Proving TheTallestAndMinionsKW import

Client Configuration:

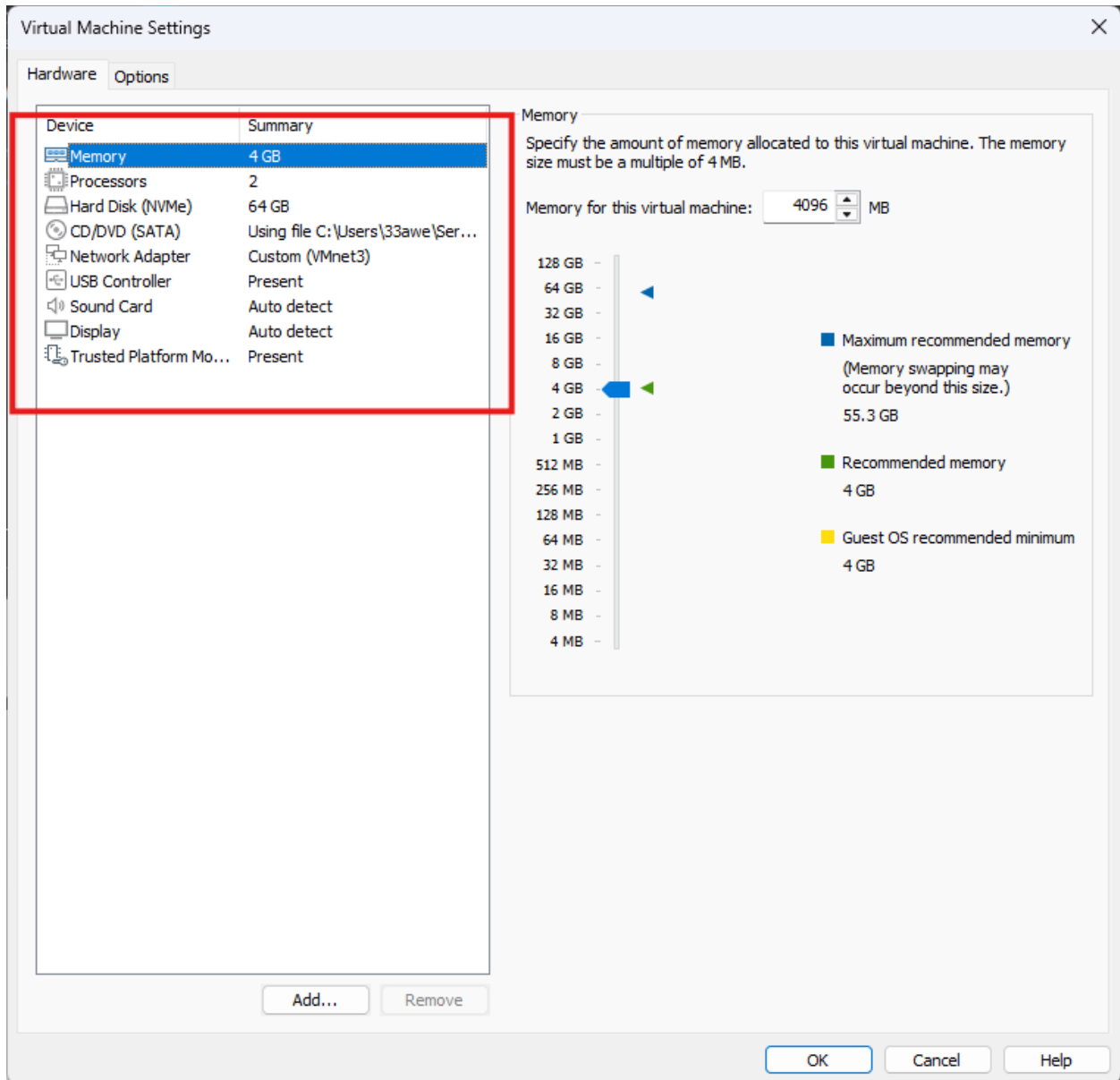


Figure 45 Client hardware

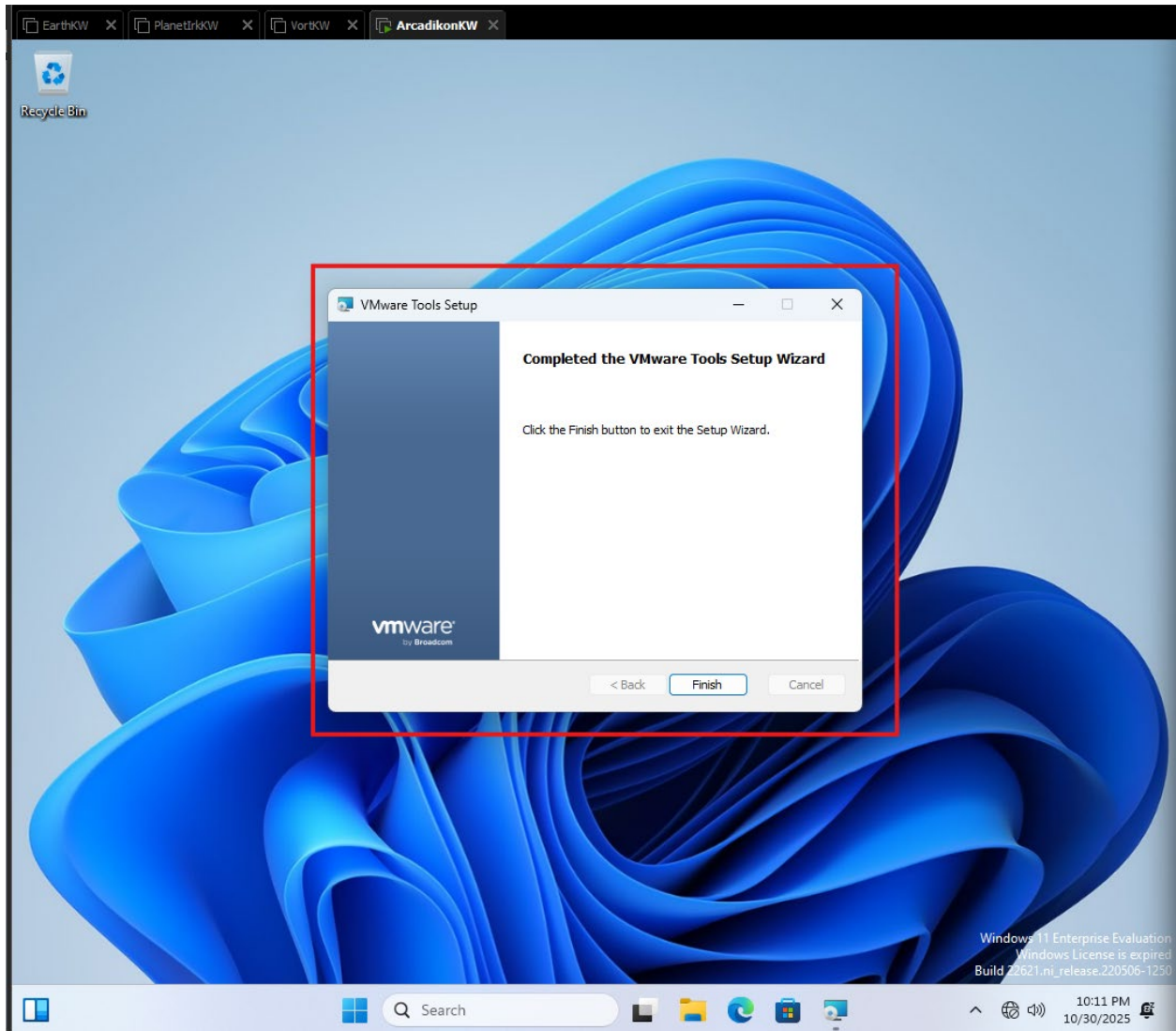


Figure 46 Client VMware Tools Install

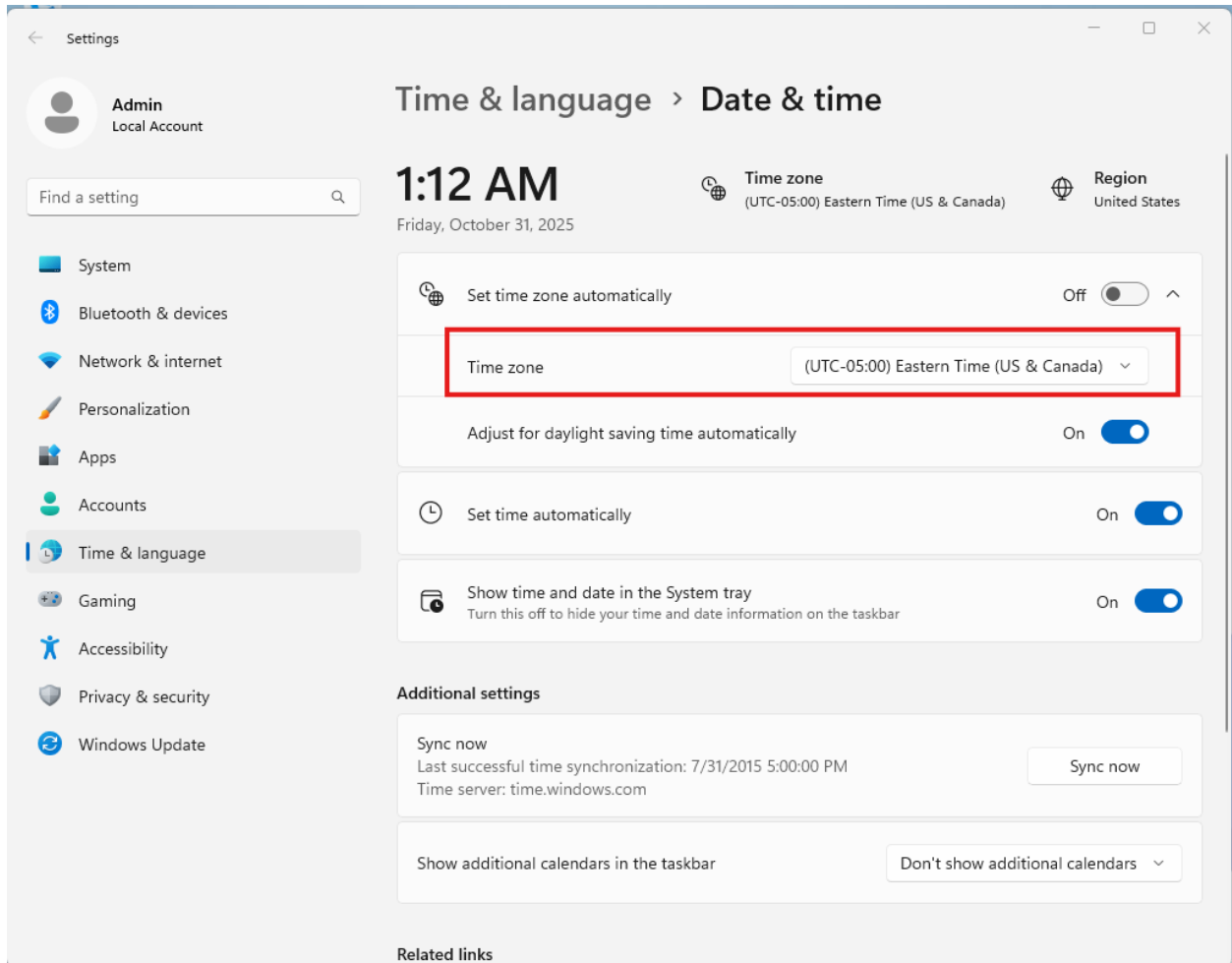


Figure 47 Client timezone configuration

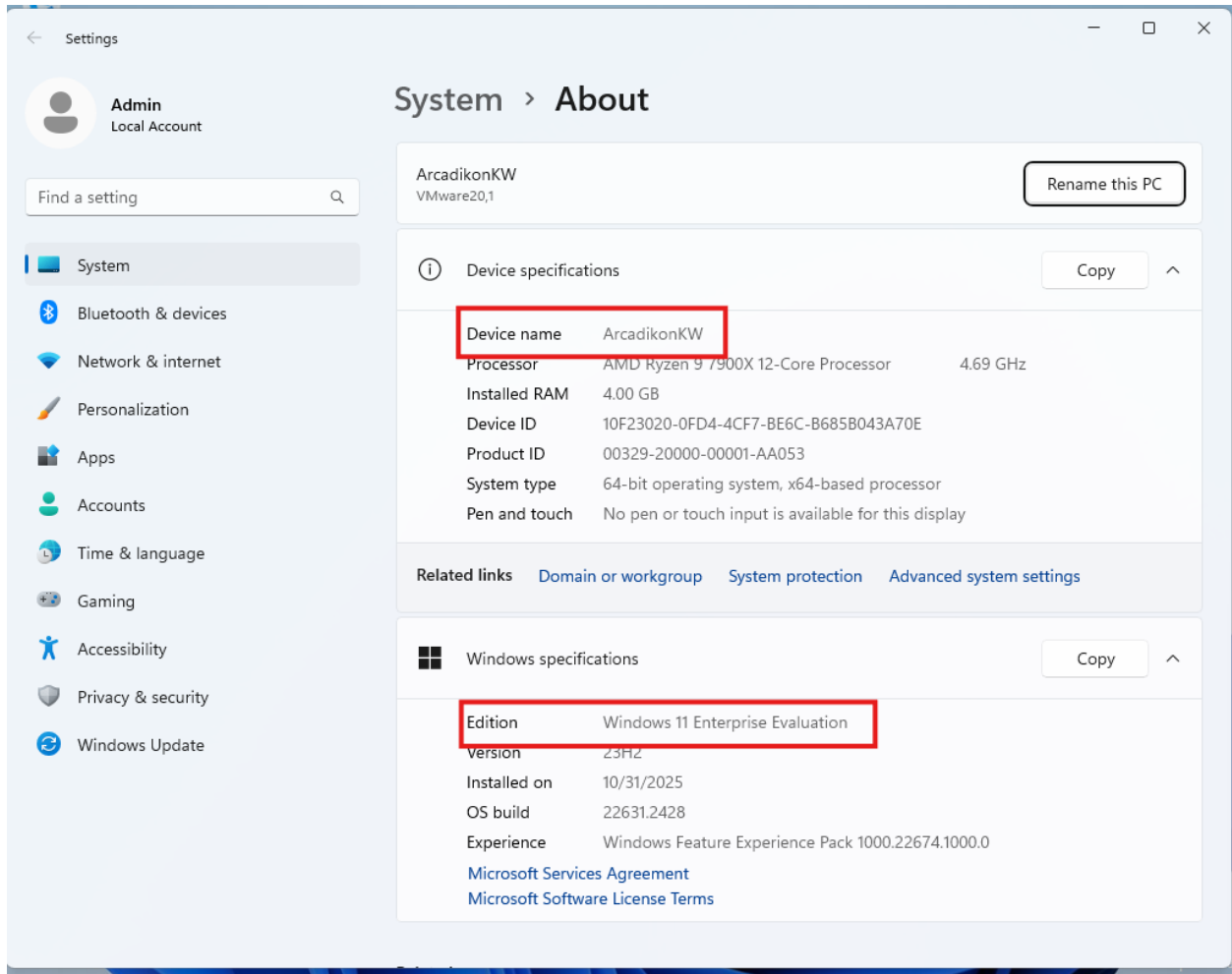


Figure 48 Client named with proper windows version installed

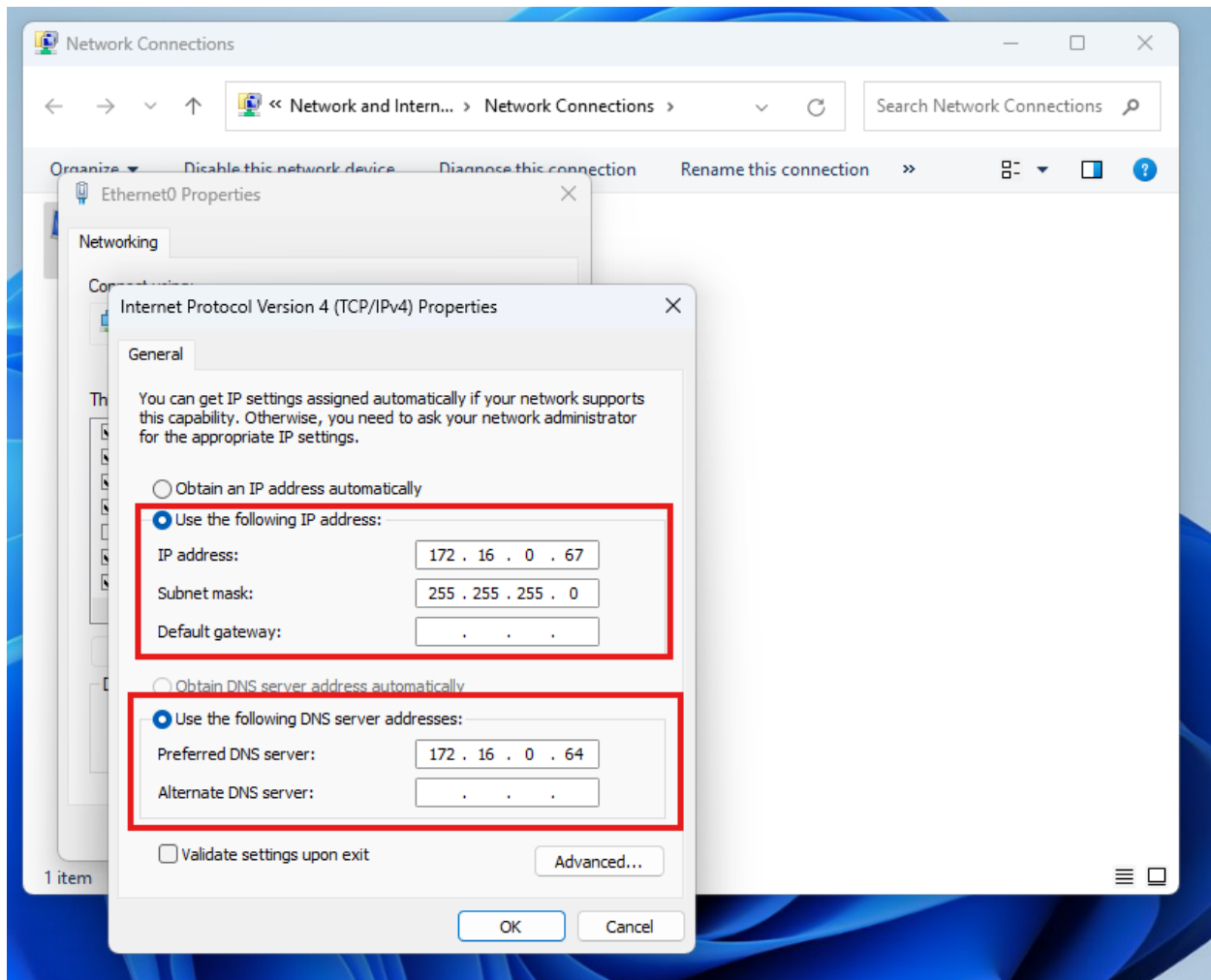
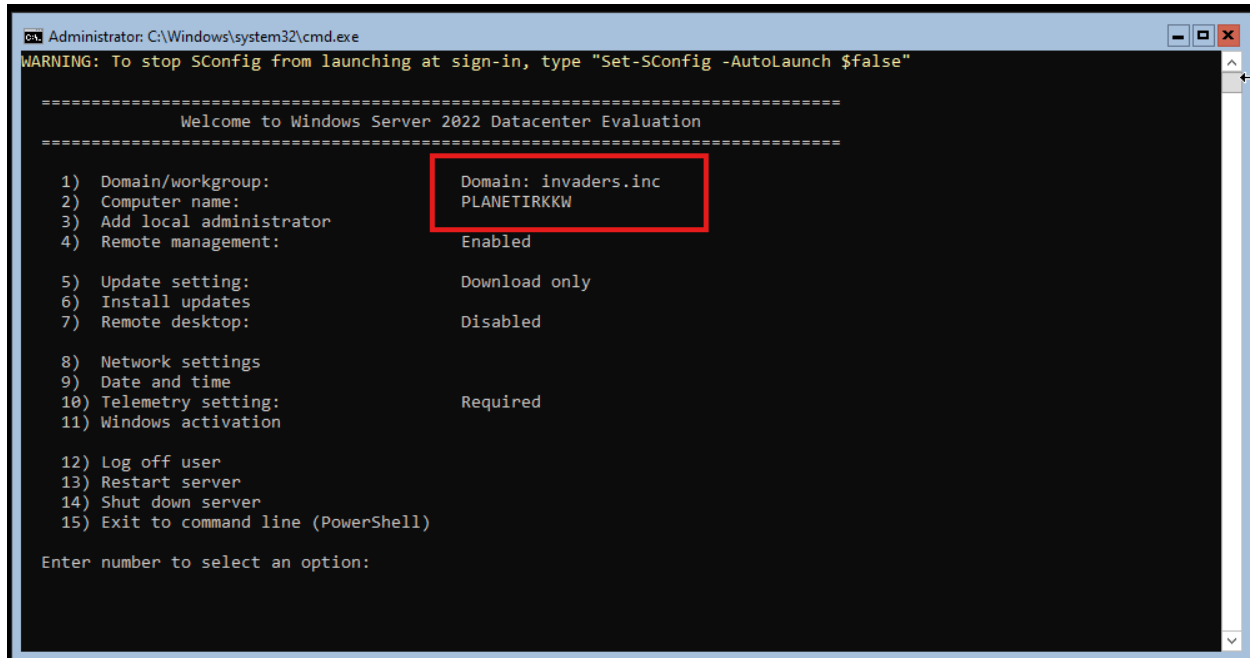


Figure 49 Client assigned a static IP

Server 2:



```
Administrator: C:\Windows\system32\cmd.exe
WARNING: To stop SConfig from launching at sign-in, type "Set-SConfig -AutoLaunch $false"

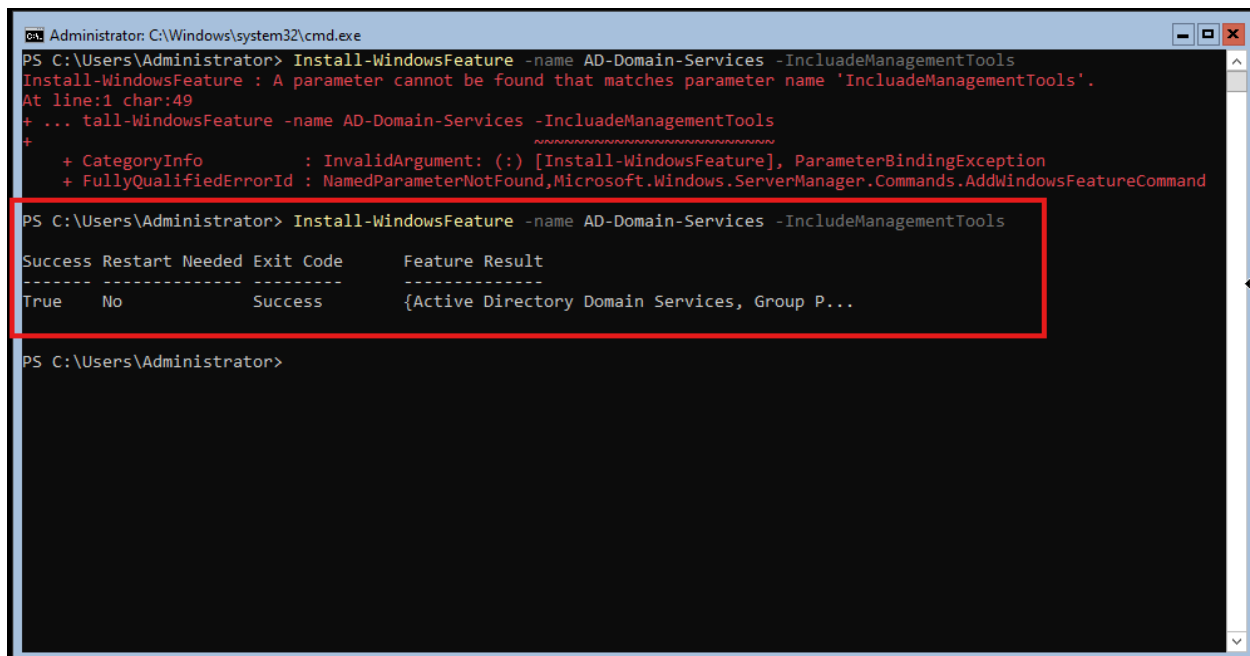
=====
Welcome to Windows Server 2022 Datacenter Evaluation
=====

1) Domain/workgroup:          Domain: invaders.inc
2) Computer name:            PLANETIRKKW
3) Add local administrator
4) Remote management:       Enabled
5) Update setting:           Download only
6) Install updates
7) Remote desktop:           Disabled
8) Network settings
9) Date and time
10) Telemetry setting:       Required
11) Windows activation

12) Log off user
13) Restart server
14) Shut down server
15) Exit to command line (PowerShell)

Enter number to select an option:
```

Figure 50 Server 2 Successfully joined domain



```
Administrator: C:\Windows\system32\cmd.exe
PS C:\Users\Administrator> Install-WindowsFeature -name AD-Domain-Services -IncludeManagementTools
Install-WindowsFeature : A parameter cannot be found that matches parameter name 'IncludeManagementTools'.
At line:1 char:49
+ ... tall-WindowsFeature -name AD-Domain-Services -IncludeManagementTools
+ ~~~~~
+ CategoryInfo          : InvalidArgument: (:) [Install-WindowsFeature], ParameterBindingException
+ FullyQualifiedErrorId : NamedParameterNotFound,Microsoft.Windows.ServerManager.Commands.AddWindowsFeatureCommand

PS C:\Users\Administrator> Install-WindowsFeature -name AD-Domain-Services -IncludeManagementTools

Success Restart Needed Exit Code      Feature Result
-----
True      No           Success      {Active Directory Domain Services, Group P...
```

Figure 51 Server 2 installing ADDS

```
Administrator: C:\Windows\system32\cmd.exe
WARNING: To launch Server Configuration tool again, run "SConfig"
PS C:\Users\Administrator> Get-WindowsFeature -name AD*

Display Name                                     Name                                     Install State
-----
[ ] Active Directory Certificate Services         AD-Certificate                         Available
  [ ] Certification Authority                   ADCS-Cert-Authority                   Available
  [ ] Certificate Enrollment Policy Web Service  ADCS-Enroll-Web-Pol                   Available
  [ ] Certificate Enrollment Web Service         ADCS-Enroll-Web-Svc                   Available
  [ ] Certification Authority Web Enrollment     ADCS-Web-Enrollment                   Available
  [ ] Network Device Enrollment Service          ADCS-Device-Enrollment                Available
  [ ] Online Responder                          ADCS-Online-Cert                       Available
[X] Active Directory Domain Services             AD-Domain-Services                    Installed
  [ ] Active Directory Federation Services       ADFS-Federation                       Available
  [ ] Active Directory Lightweight Directory Services ADLDS                                  Available
  [ ] Active Directory Rights Management Services ADRMS                                  Available
  [ ] Active Directory Rights Management Server  ADRMS-Server                           Available
  [ ] Identity Federation Support               ADRMS-Identity                         Available

PS C:\Users\Administrator> _
```

Figure 52 Server 2 proving ADDS install

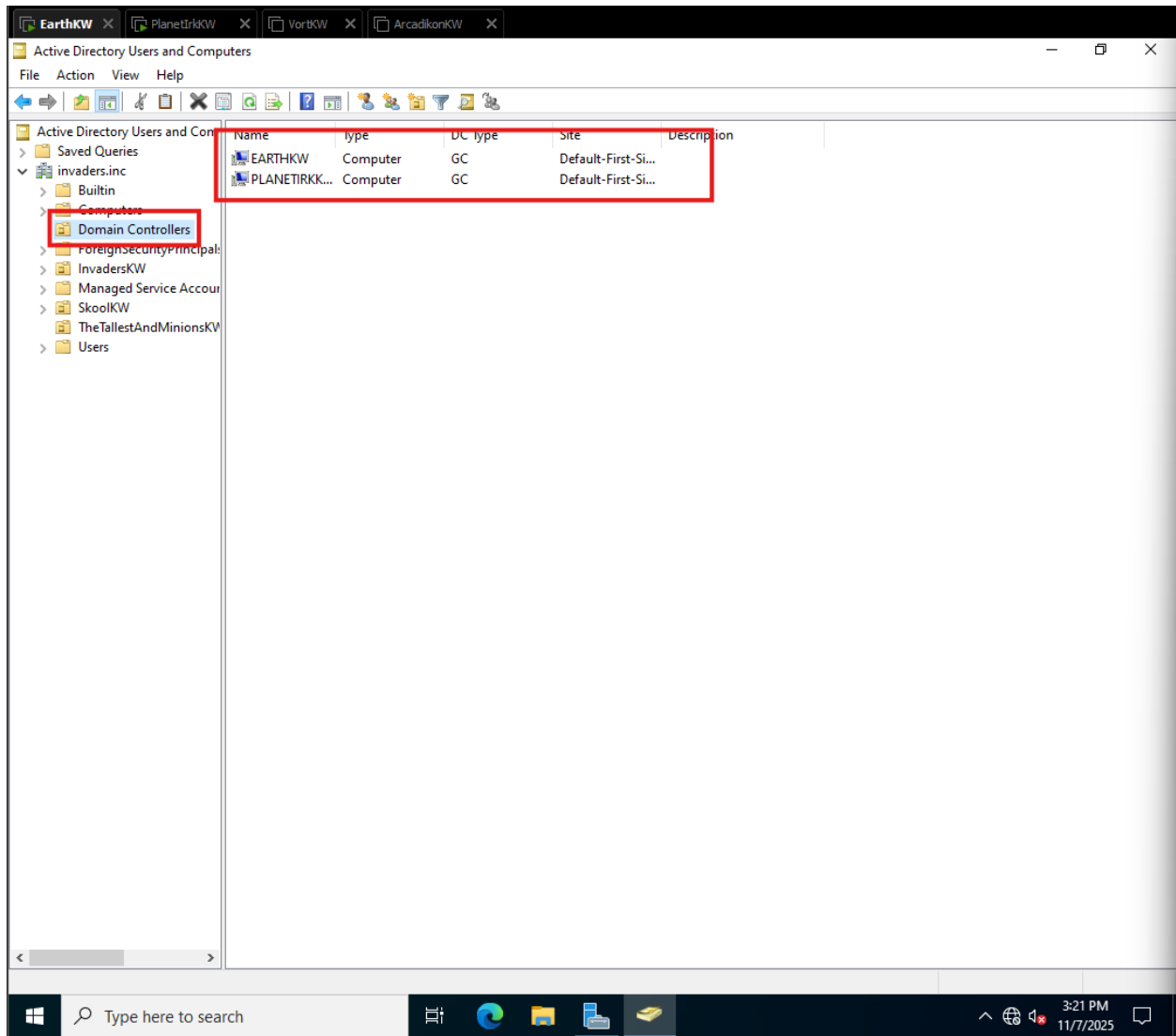


Figure 53 Server 2 (PlanetIRKKW) promoted to DC

```

Administrator: C:\Windows\system32\cmd.exe
WARNING: To launch Server Configuration tool again, run "SConfig"
PS C:\Users\Administrator.INVADERS> Install-WindowsFeature DHCP -IncludeManagementTools

Success Restart Needed Exit Code      Feature Result
-----
True      No              Success          {DHCP Server}

PS C:\Users\Administrator.INVADERS> Get-WindowsFeature -Name DHCP

Display Name          Name          Install State
-----
[X] DHCP Server      DHCP          Installed

PS C:\Users\Administrator.INVADERS>

```

Figure 54 Install DHCP on Server 2

```

Administrator: C:\Windows\system32\cmd.exe
WARNING: To launch Server Configuration tool again, run "SConfig"
PS C:\Users\Administrator.INVADERS> Install-WindowsFeature DHCP -IncludeManagementTools

Success Restart Needed Exit Code      Feature Result
-----
True      No              Success          {DHCP Server}

PS C:\Users\Administrator.INVADERS> Get-WindowsFeature -Name DHCP

Display Name          Name          Install State
-----
[X] DHCP Server      DHCP          Installed

PS C:\Users\Administrator.INVADERS> Add-DhcpServerInDC -DnsName PlanetIrkKW.invaders.inc -IPAddress 72.16.0.65
Add-DhcpServerInDC : A parameter cannot be found that matches parameter name 'DnsName'.
At line:1 char:20
+ Add-DhcpServerInDC -DnsName PlanetIrkKW.invaders.inc -IPAddress 72.16 ...
+ ~~~~~
+ CategoryInfo          : InvalidArgument: (:) [Add-DhcpServerInDC], ParameterBindingException
+ FullyQualifiedErrorId : NamedParameterNotFound,Add-DhcpServerInDC

PS C:\Users\Administrator.INVADERS> Add-DhcpServerInDC -DnsName PlanetIrkKW.invaders.inc -IPAddress 172.16.0.65
PS C:\Users\Administrator.INVADERS>

```

Figure 55 Adding DHCP server to Domain Controller

```
Administrator: C:\Windows\system32\cmd.exe
PS C:\Users\Administrator.INVADERS> Get-DhcpServerInDC

IPAddress           DnsName
-----
172.16.0.65         planetirkkw.invaders.inc

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

Figure 56 Proving DHCP attach to DC

```
Administrator: C:\Windows\system32\cmd.exe
PS C:\Users\Administrator.INVADERS> Add-DhcpServerv4Scope -Name "MacMeatiesKW" -StartRange 172.16.0.96 -EndRange 172.16.0.99 -SubnetMask 255.255.255.0
PS C:\Users\Administrator.INVADERS> Get-DhcpServerv4Scope

ScopeId           SubnetMask        Name              State      StartRange        EndRange          LeaseDuration
-----
172.16.0.0        255.255.255.0    MacMeatiesKW     Active    172.16.0.96       172.16.0.99      8:00:00:00

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

Figure 57 Setting up and proving DHCP scope "MacMeatiesKW"

Join Client to DHCP:

```
Windows PowerShell (x86)
PS C:\Users\Zim> ipconfig /all

Windows IP Configuration

Host Name . . . . . : ArcadikonKW
Primary Dns Suffix . . . . . : invaders.inc
Node Type . . . . . : Hybrid
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No
DNS Suffix Search List. . . . . : invaders.inc

Ethernet adapter Ethernet0:

Connection-specific DNS Suffix . :
Description . . . . . : Intel(R) 82574L Gigabit Network Connection
Physical Address. . . . . : 00-0c-29-1a-fe-80
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . : Yes
Link-local IPv6 Address . . . . . : fe80::9dec:b5f1:a6c4:427%5(Preferred)
IPv4 Address. . . . . : 172.16.0.96(Preferred)
Subnet Mask . . . . . : 255.255.255.0
Lease Obtained. . . . . : Thursday, November 15, 2025 7:37:35 PM
Lease Expires . . . . . : Friday, November 21, 2025 7:37:34 PM
Default Gateway . . . . . :
DHCP Server . . . . . : 172.16.0.65
DHCPv6 IAID . . . . . : 100666409
DHCPv6 Client DUID. . . . . : 00-01-00-01-30-95-FC-3D-00-0C-29-1A-FE-80
DNS Servers . . . . . : 172.16.0.64
NetBIOS over Tcpip. . . . . : Enabled

PS C:\Users\Zim>
```

Figure 58 Proving client DHCP configuration

```
Administrator: C:\Windows\system32\cmd.exe
PS C:\Users\Administrator.INVADERS> Get-DhcpServerv4Lease -ScopeID 172.16.0.0

IPAddress      ScopeId      ClientId      HostName      AddressState      LeaseExpiryTime
-----
172.16.0.96    172.16.0.0   00-0c-29-1a-fe-80  ArcadikonKW.invad... Active            11/21/2025 7:35:49 PM

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

Figure 59 Proving client DHCP lease

Server 3 Configuration:

The screenshot shows the Windows Server Manager interface for a local server named VortKW. The left-hand navigation pane has 'File and Storage Services' selected. The main area displays the 'PROPERTIES' for the server, with a red box highlighting the 'Computer name' (VortKW) and 'Workgroup' (invaders.inc). Below the properties, the 'EVENTS' section shows a list of 68 total events, with a table of the most recent ones:

Server Name	ID	Severity	Source	Log	Date and Time
VORTKW	1014	Error	Microsoft-Windows-Security-SPP	Application	11/14/2025 2:05:22 PM
VORTKW	8200	Error	Microsoft-Windows-Security-SPP	Application	11/14/2025 2:05:22 PM
VORTKW	1014	Warning	Microsoft-Windows-DNS Client Events	System	11/14/2025 2:05:22 PM
VORTKW	10016	Warning	Microsoft-Windows-DistributedCOM	System	11/14/2025 2:05:18 PM
VORTKW	8198	Error	Microsoft-Windows-Security-SPP	Application	11/14/2025 2:05:09 PM
VORTKW	1014	Error	Microsoft-Windows-Security-SPP	Application	11/14/2025 2:05:09 PM
VORTKW	8200	Error	Microsoft-Windows-Security-SPP	Application	11/14/2025 2:05:09 PM

Figure 60 Server 3 FSRM install and joining domain proof

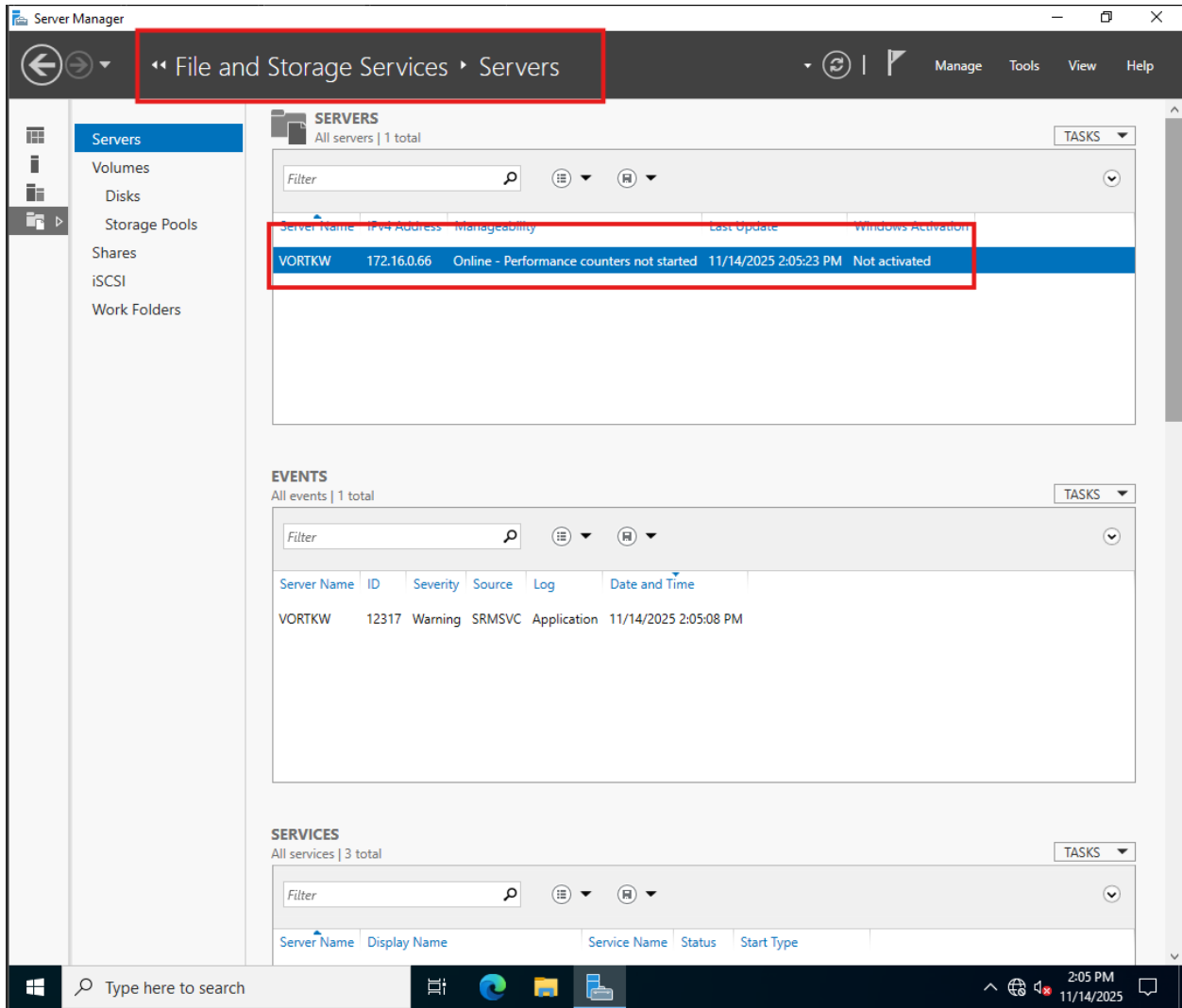


Figure 61 Server 3 FSRM install proof

Share Configuration:

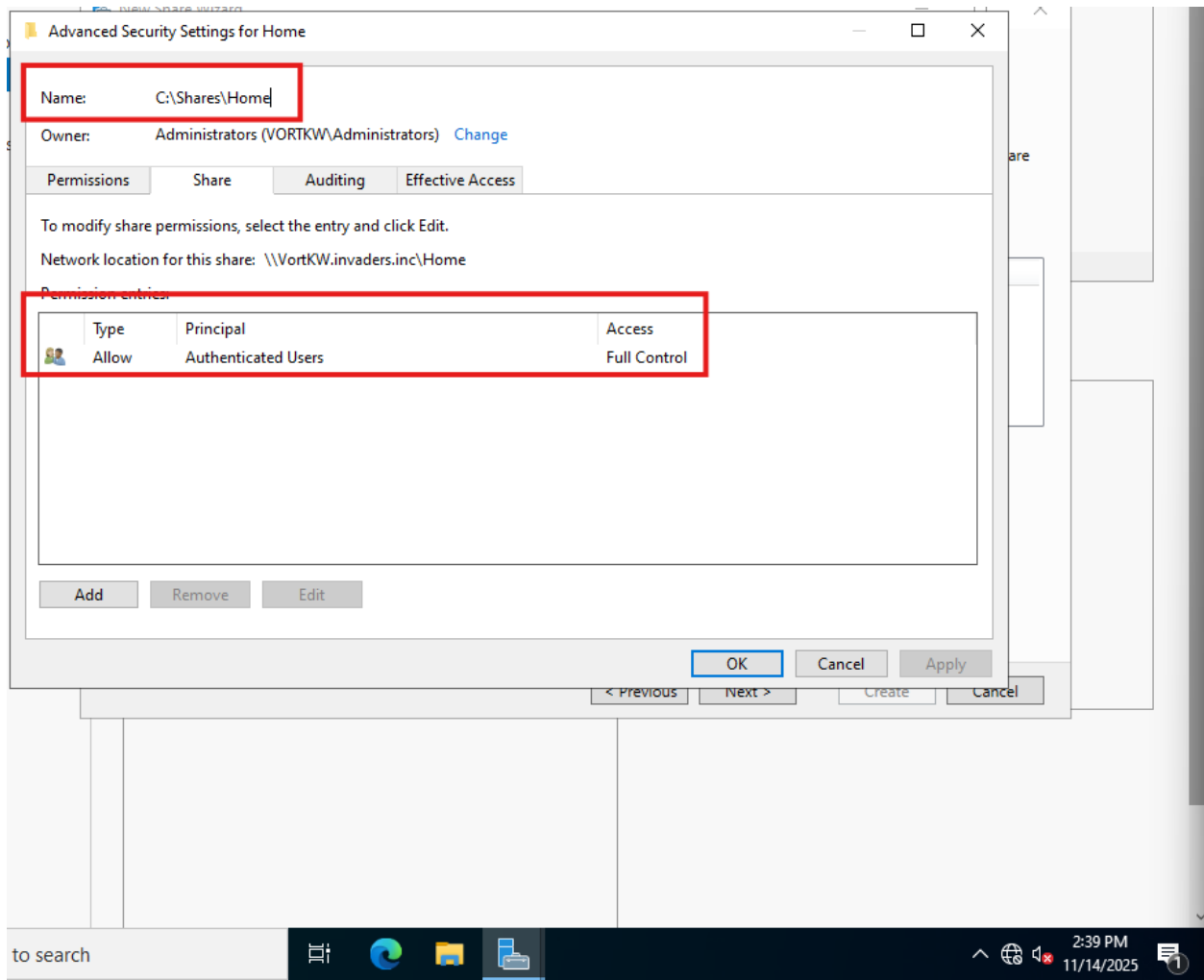


Figure 62 Home share permission configuration

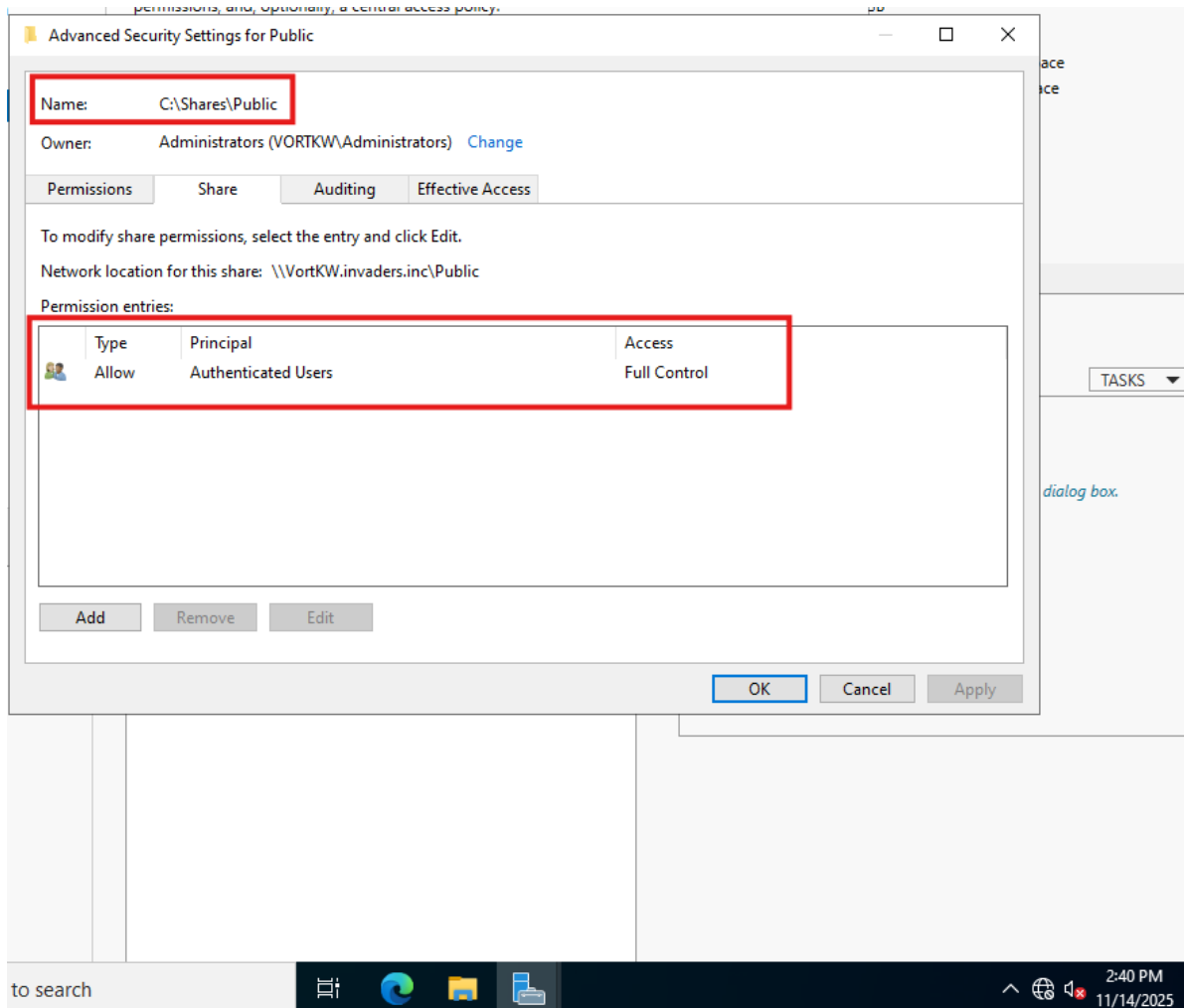


Figure 63 Public share permission configuration

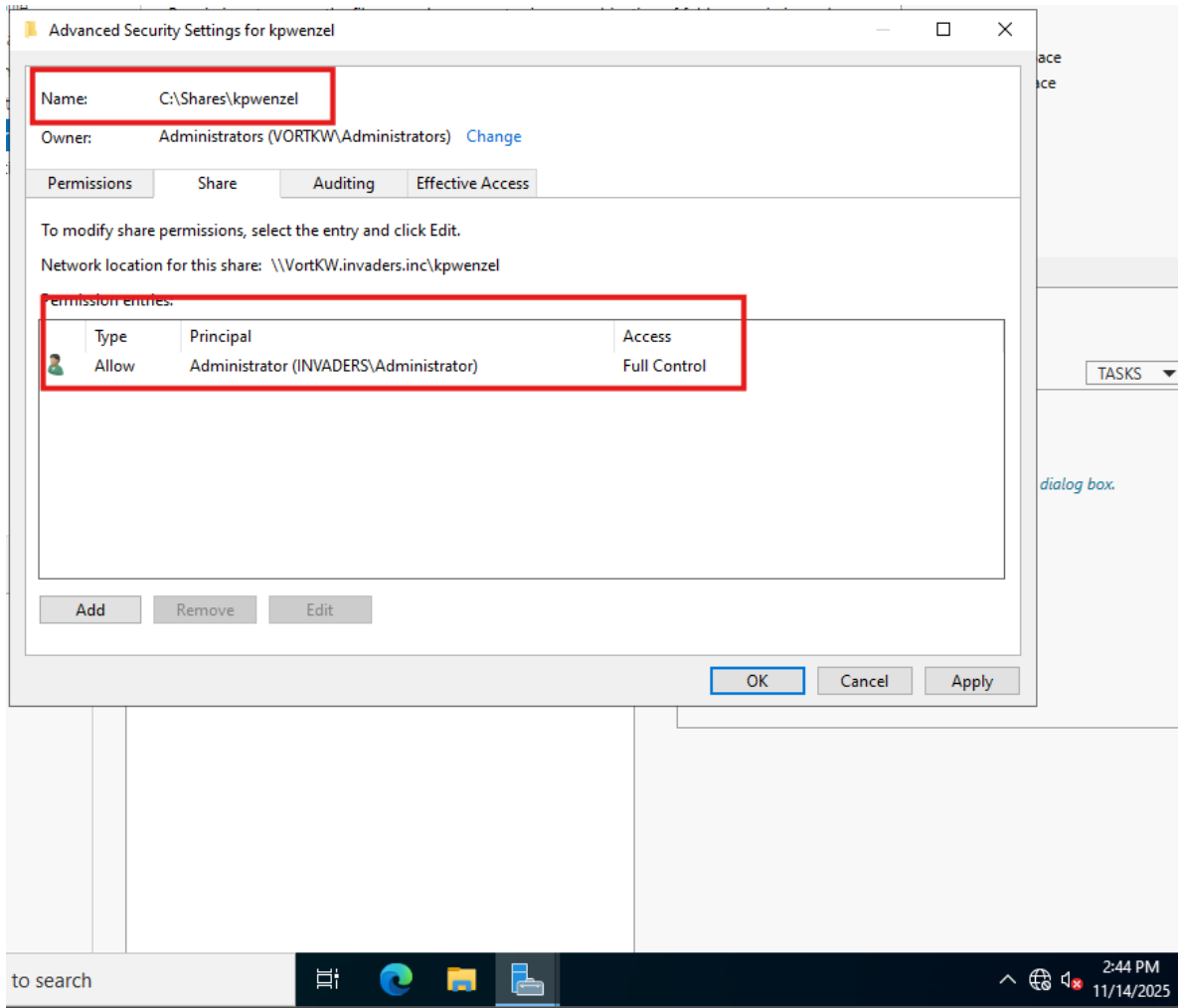


Figure 64 kpwenzel share permission configuration

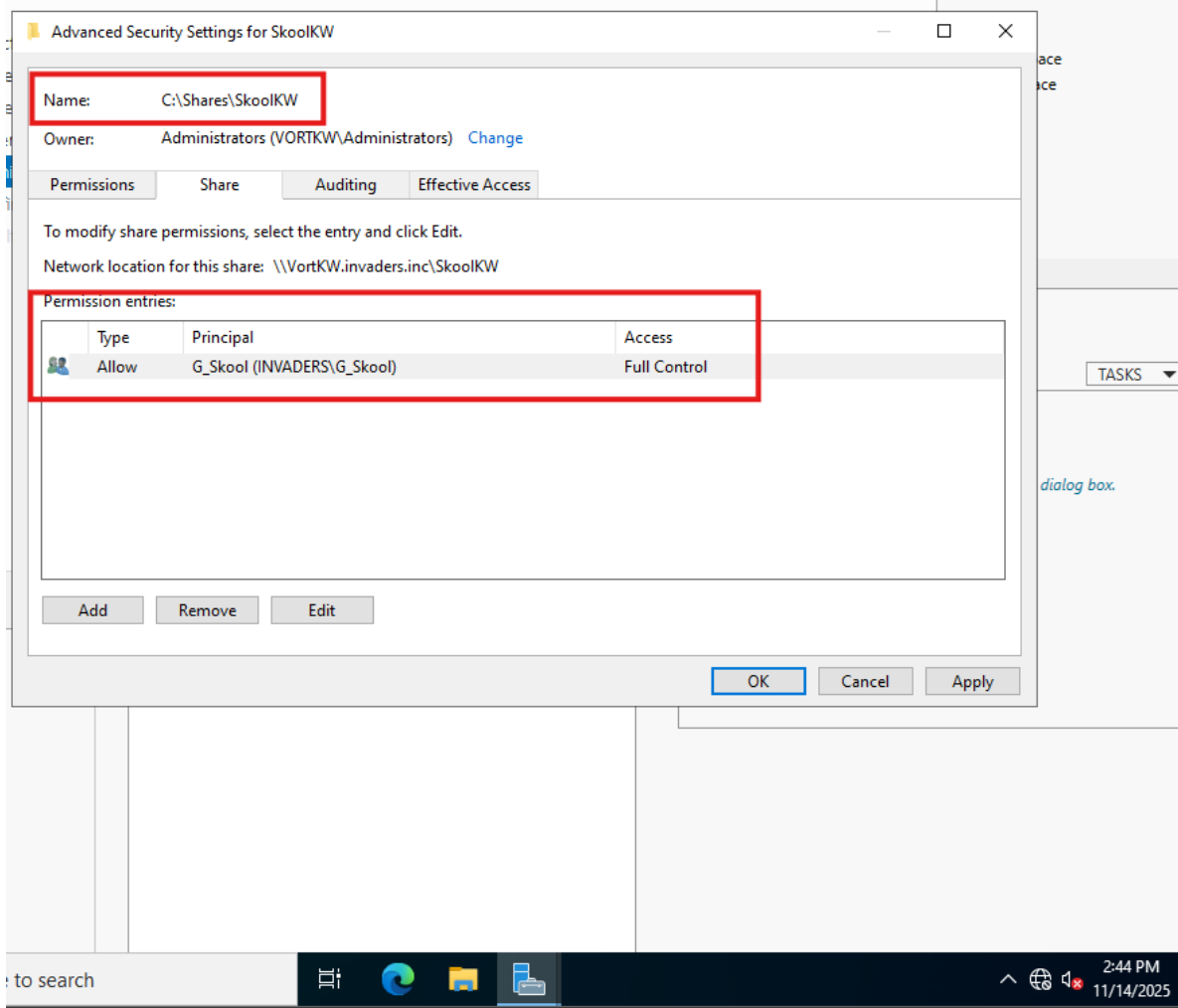


Figure 65 SkoolKW share permission configuration

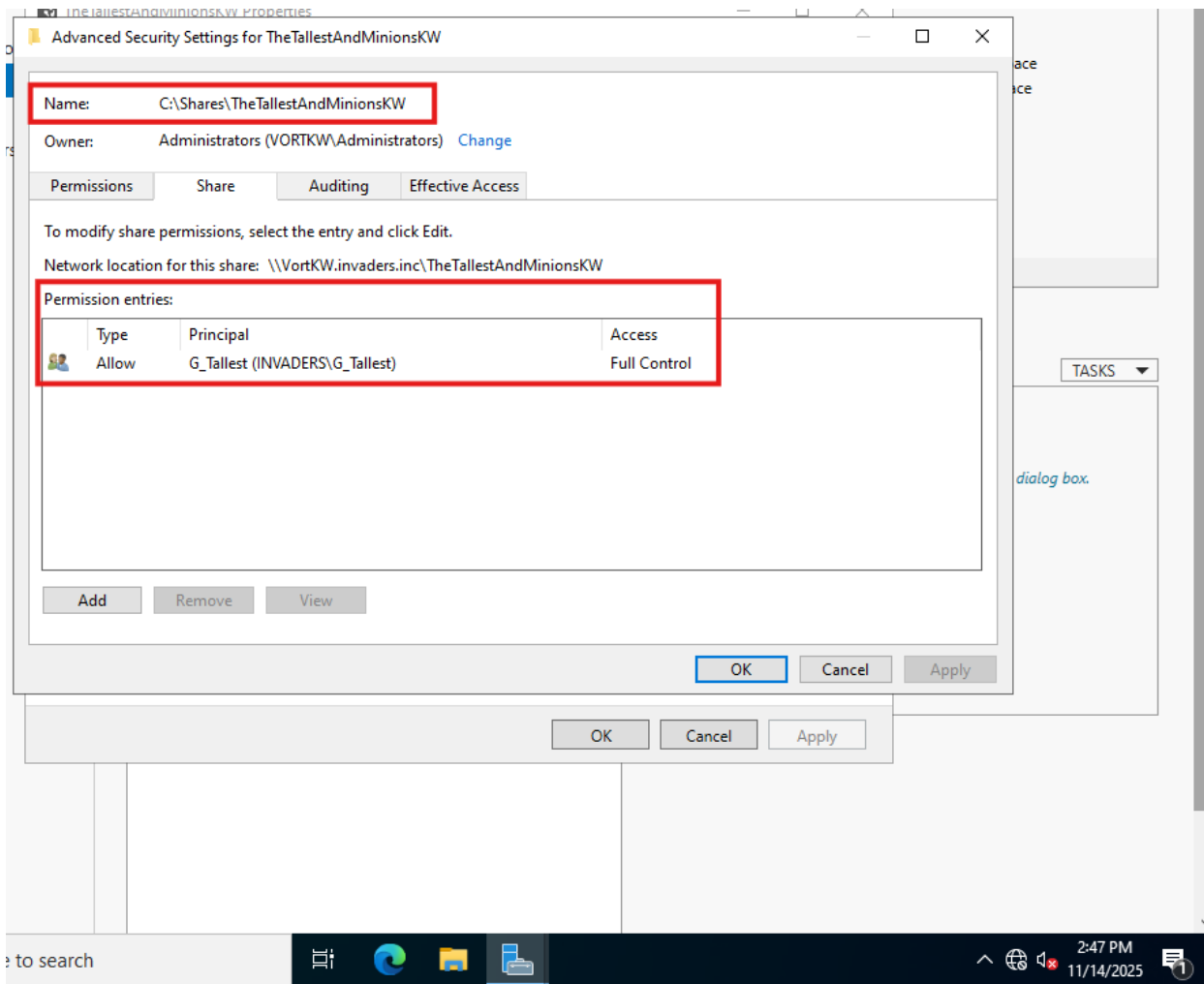


Figure 66 TheTallestAndMinionsKW share permission configuration

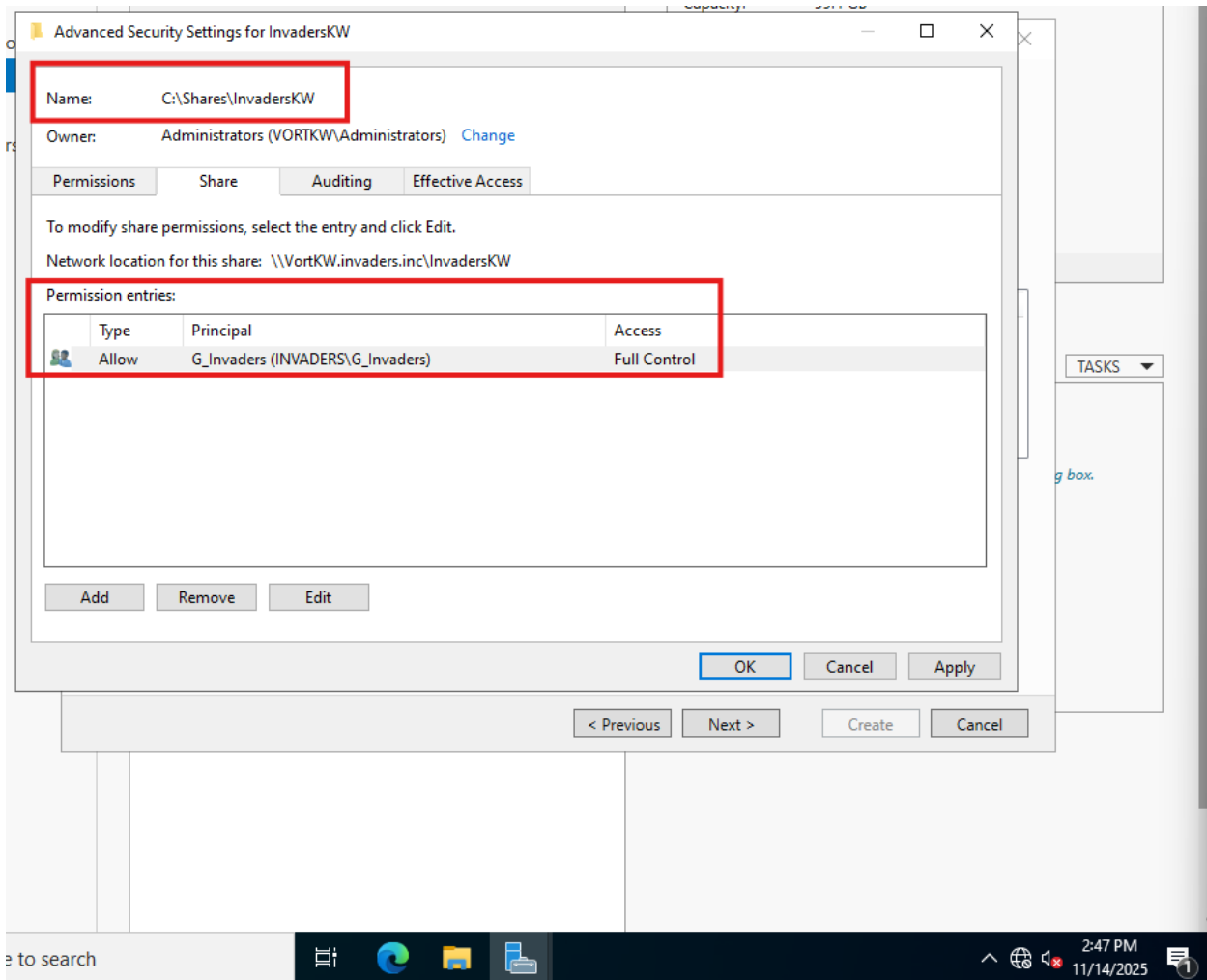


Figure 67 InvadersKW share permission configuration

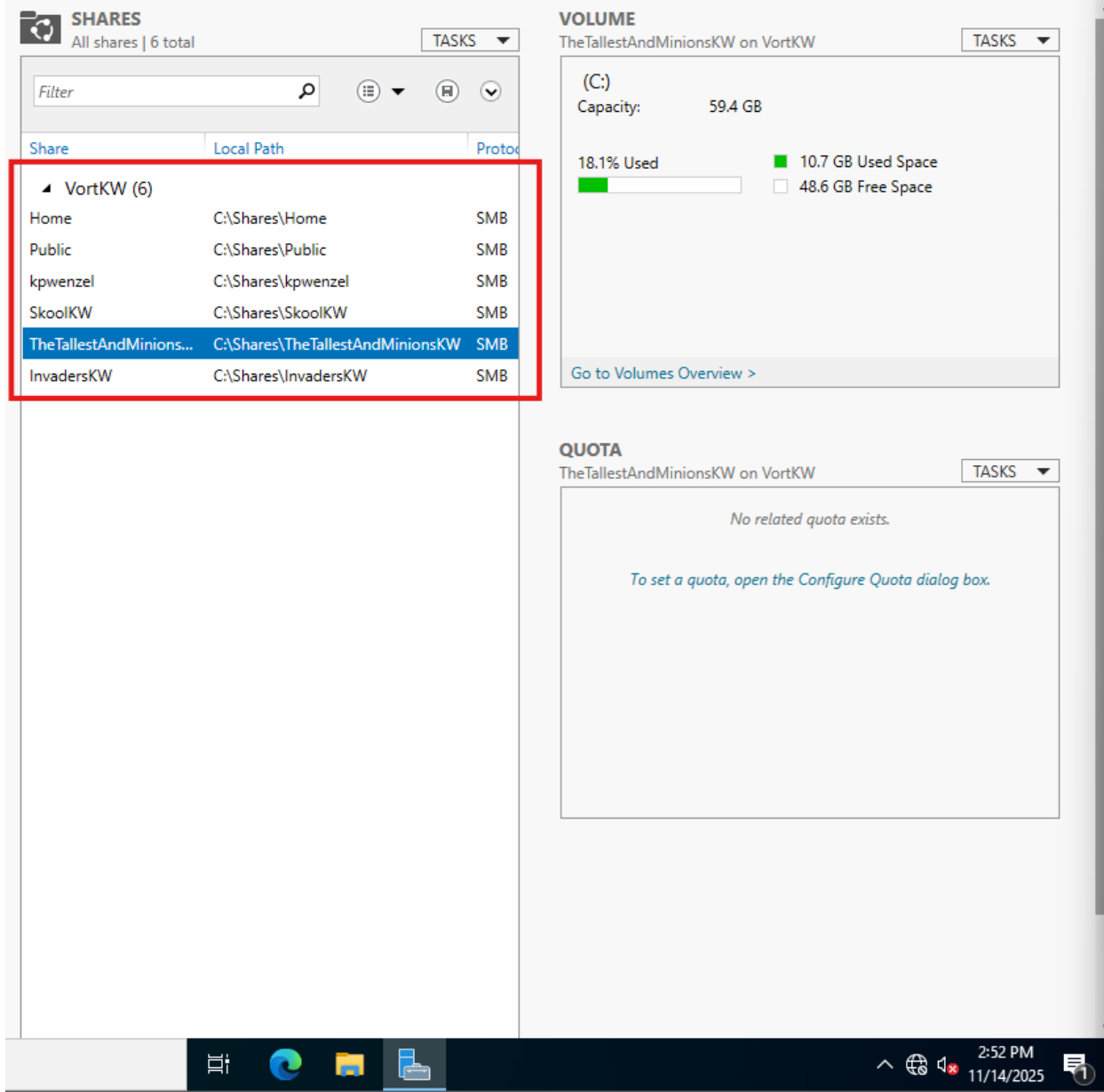


Figure 68 Share configuration proof

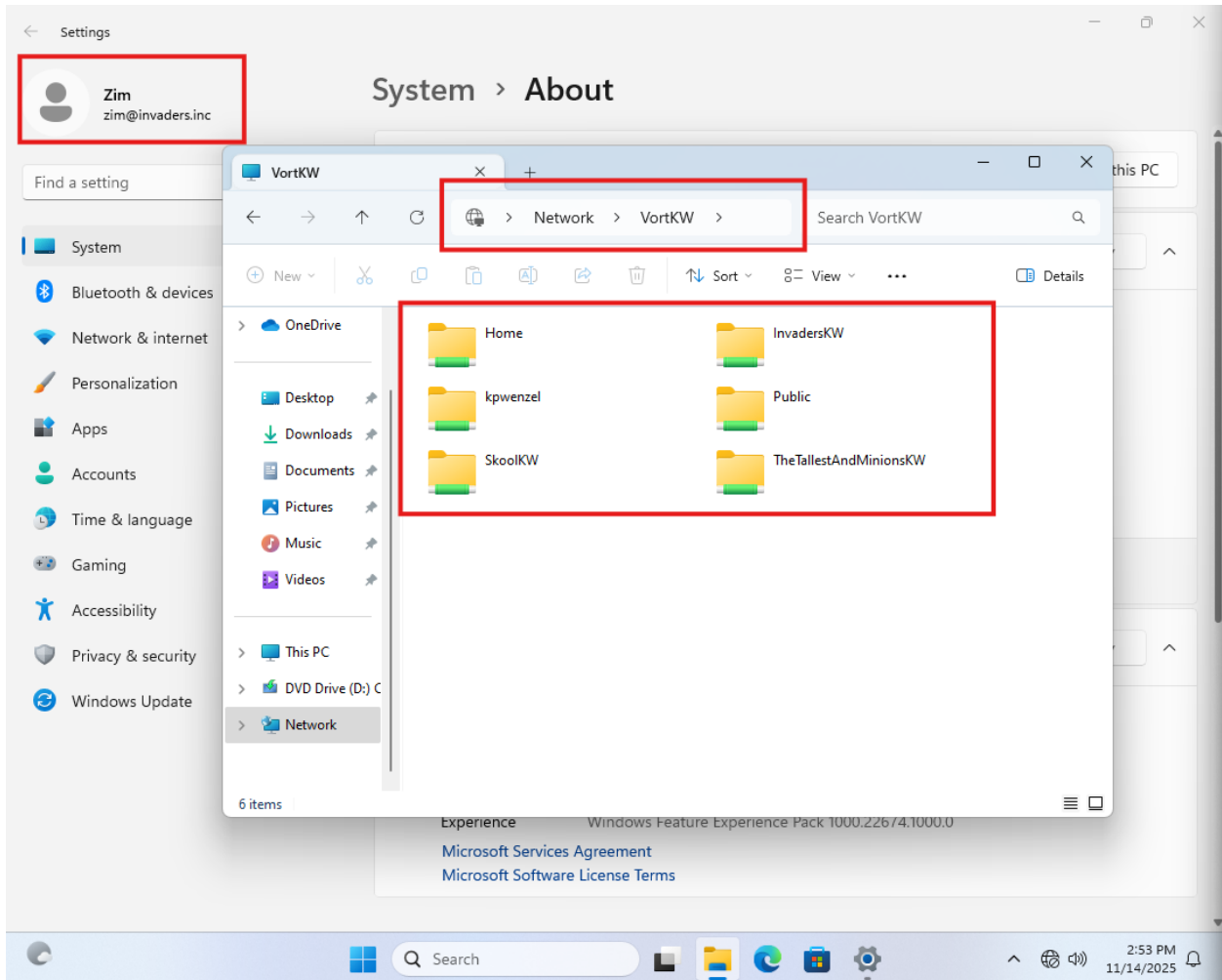


Figure 69 Share listing proof accessed as zim

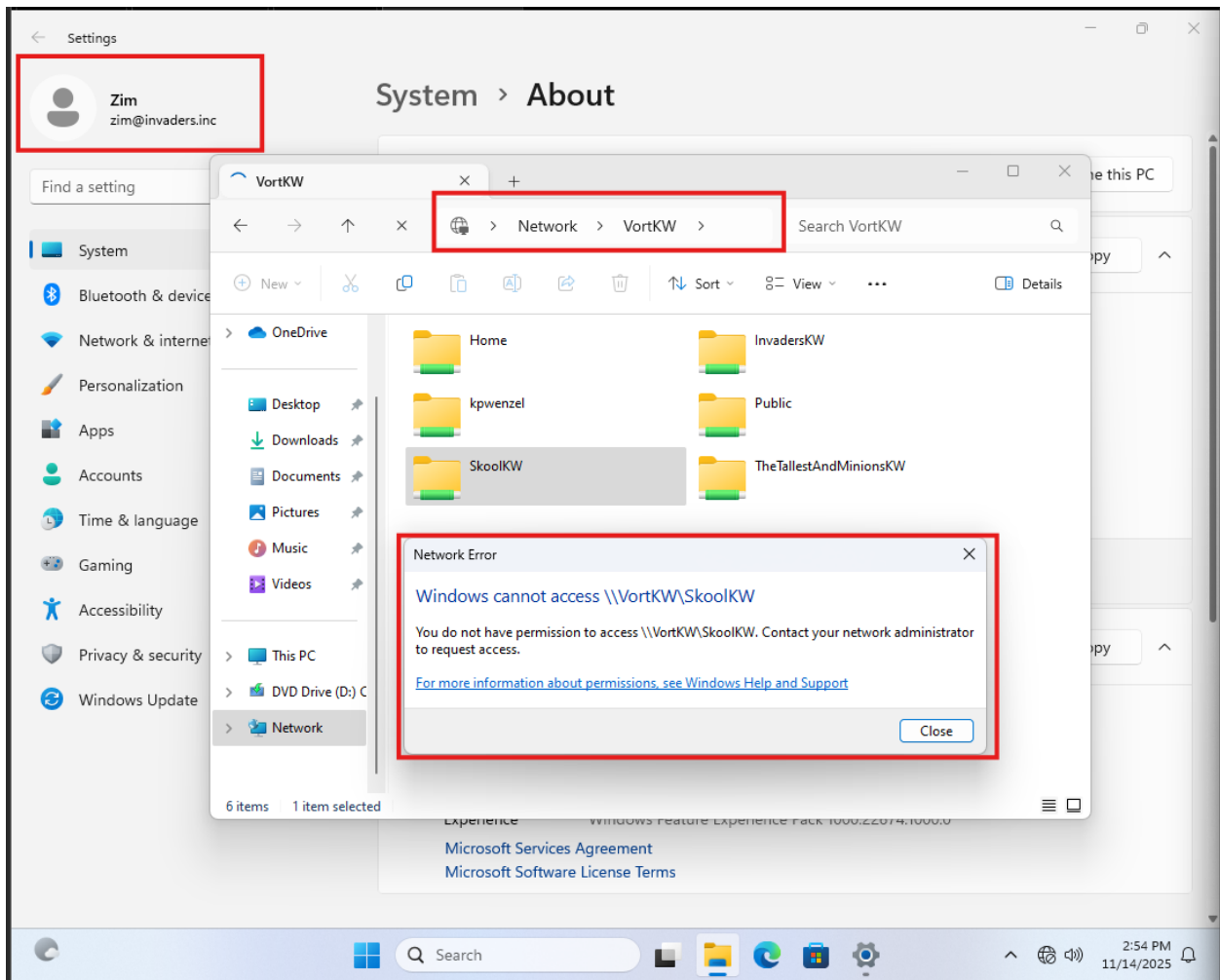


Figure 70 Zim can't access share he's not allowed to

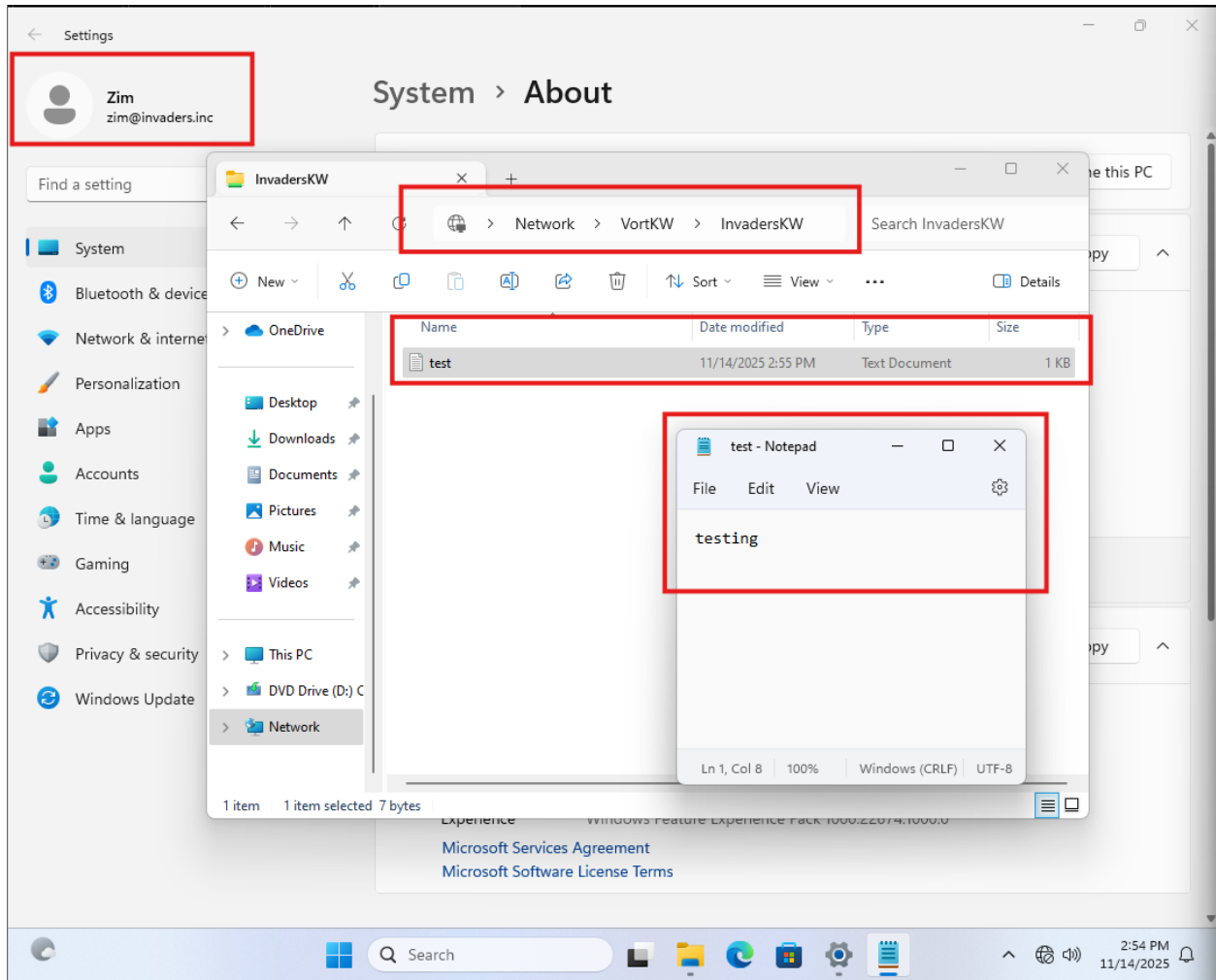


Figure 71 Zim can access a share he's allowed and can create files

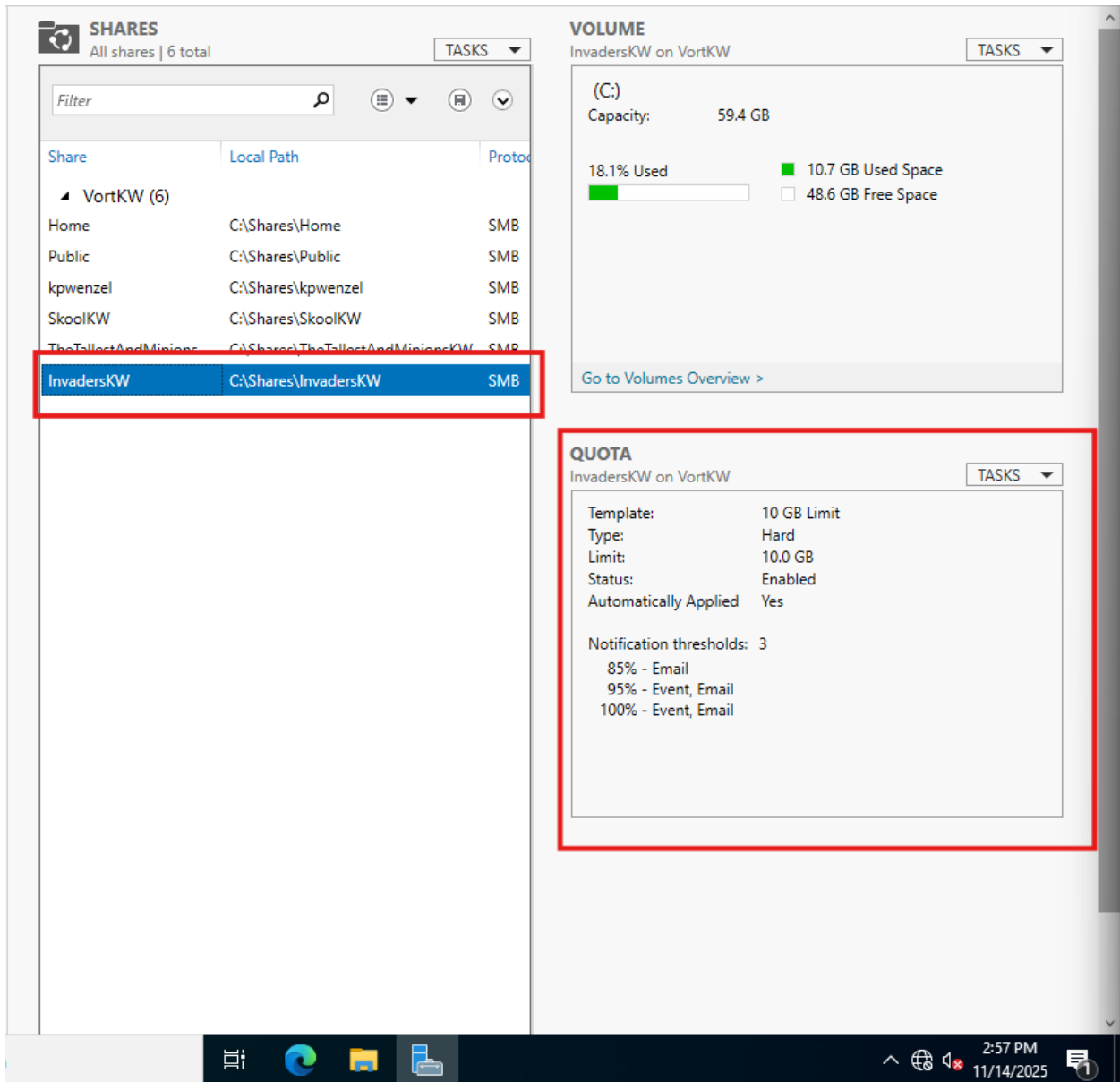


Figure 72 InvadersKW quota

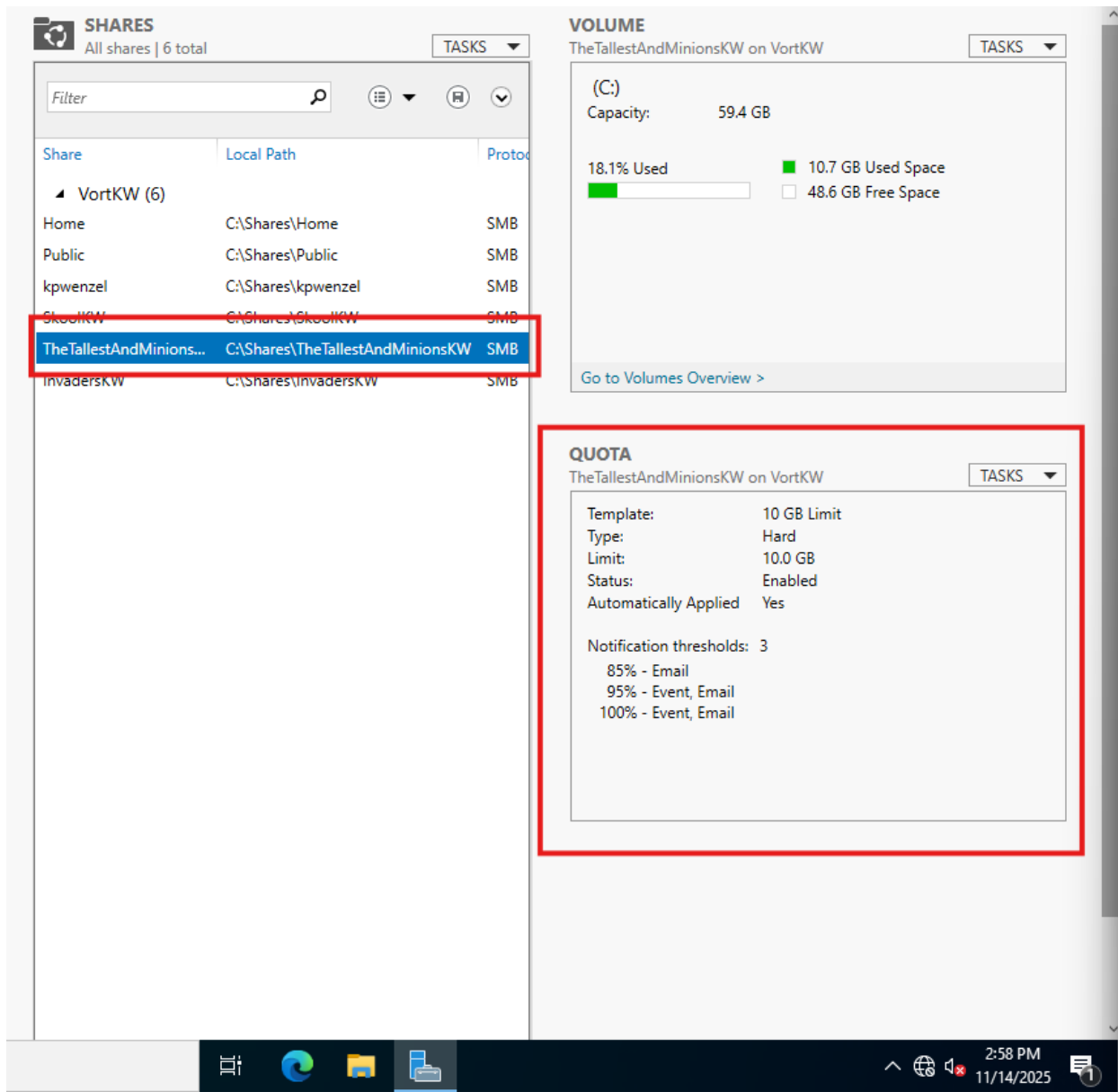


Figure 73 TheTallestAndMinionsKW quota

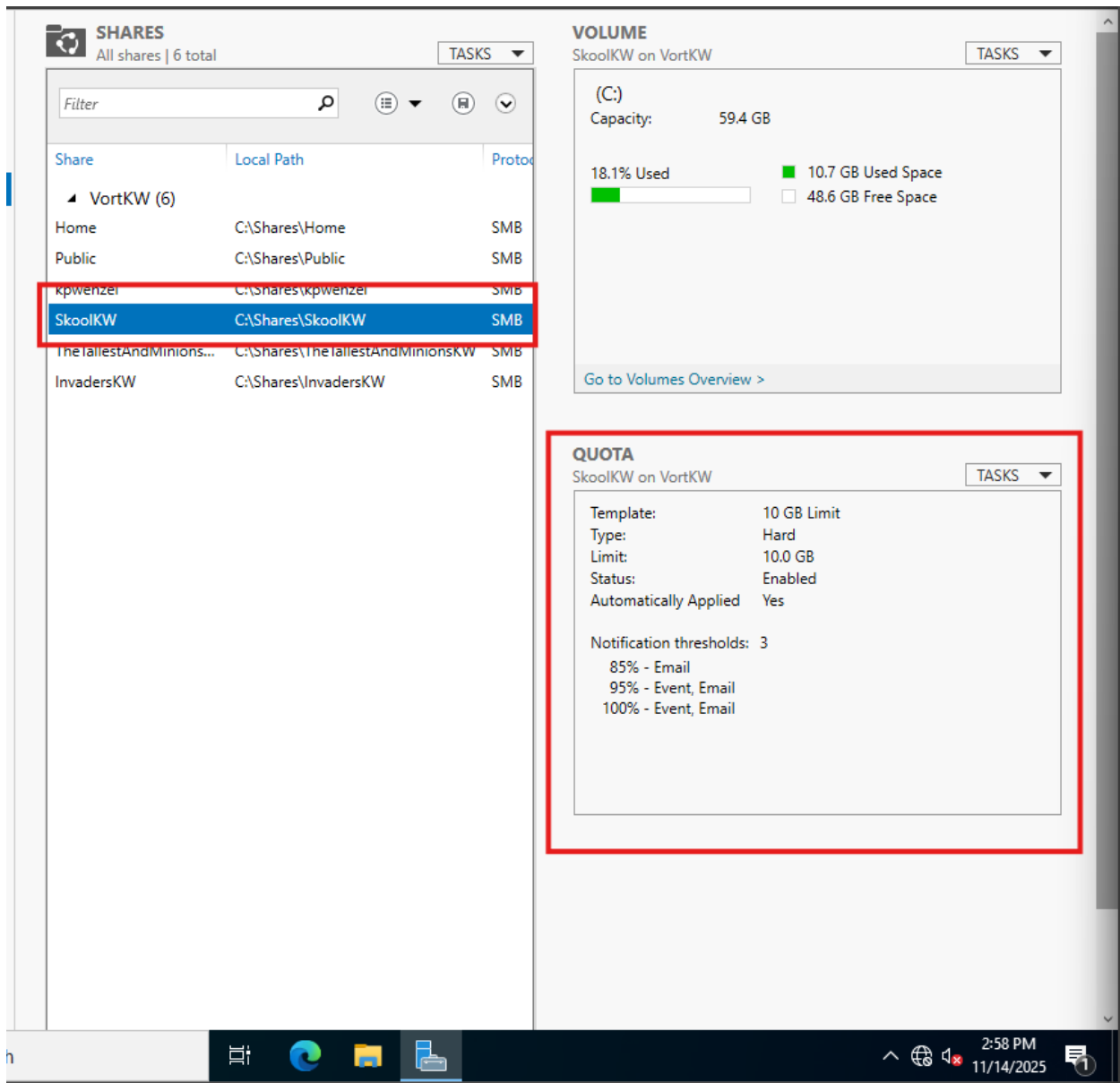


Figure 74 SkoolKW quota

The screenshot displays the Windows File Explorer interface. On the left, the 'SHARES' pane shows a list of shares under 'VortKW (6)'. The 'kpwenzel' share is highlighted with a red box. The 'VOLUME' pane on the right shows details for '(C:) kpwenzel on VortKW', including a capacity of 59.4 GB and a usage of 18.1% (10.7 GB used, 48.6 GB free). Below this, the 'QUOTA' pane for 'kpwenzel on VortKW' is also highlighted with a red box, showing a 10 GB limit, hard type, and enabled status.

Share	Local Path	Protocol
Home	C:\Shares\Home	SMB
Public	C:\Shares\Public	SMB
kpwenzel	C:\Shares\kpwenzel	SMB
SkoolKW	C:\Shares\SkoolKW	SMB
TheTallestAndMinions...	C:\Shares\TheTallestAndMinionsKW	SMB
InvadersKW	C:\Shares\InvadersKW	SMB

VOLUME
kpwenzel on VortKW

(C:) Capacity: 59.4 GB

18.1% Used 10.7 GB Used Space
48.6 GB Free Space

QUOTA
kpwenzel on VortKW

Template: 10 GB Limit
Type: Hard
Limit: 10.0 GB
Status: Enabled
Automatically Applied: Yes

Notification thresholds: 3
85% - Email
95% - Event, Email
100% - Event, Email

Figure 75 kpwenzel quota

The screenshot displays the Windows File Explorer interface with three main panels:

- SHARES:** Shows a list of shares under 'VortKW (6)'. The 'Public' share is highlighted with a red box. Its local path is 'C:\Shares\Public' and the protocol is 'SMB'.
- VOLUME:** Shows details for '(C:) Public on VortKW'. Capacity is 59.4 GB. Usage is 18.1% (10.7 GB Used Space, 48.6 GB Free Space).
- QUOTA:** Shows settings for 'Public on VortKW'. Template: 10 GB Limit, Type: Hard, Limit: 10.0 GB, Status: Enabled, Automatically Applied: Yes. Notification thresholds: 3 (85% - Email, 95% - Event, Email, 100% - Event, Email).

The Windows taskbar at the bottom shows the system tray with the time 2:58 PM and date 11/14/2025.

Figure 76 Public quota

The screenshot displays the Windows File Explorer interface. On the left, the 'SHARES' pane shows a list of shares under 'VortKW (6)'. The 'Home' share is highlighted, with its local path 'C:\Shares\Home' and protocol 'SMB'. On the right, the 'VOLUME' pane shows details for '(C:) Home on VortKW', including a capacity of 59.4 GB and a usage of 18.1% (10.7 GB used, 48.6 GB free). Below this, the 'QUOTA' pane is highlighted with a red box, showing a 10 GB limit, hard type, and notification thresholds.

Share	Local Path	Protocol
Home	C:\Shares\Home	SMB
Public	C:\Shares\Public	SMB
kpwenzel	C:\Shares\kpwenzel	SMB
SkoolKW	C:\Shares\SkoolKW	SMB
TheTallestAndMinions...	C:\Shares\TheTallestAndMinionsKW	SMB
InvadersKW	C:\Shares\InvadersKW	SMB

VOLUME
Home on VortKW

(C:) Capacity: 59.4 GB

18.1% Used 10.7 GB Used Space
48.6 GB Free Space

QUOTA
Home on VortKW

Template: 10 GB Limit
Type: Hard
Limit: 10.0 GB
Status: Enabled
Automatically Applied: Yes

Notification thresholds: 3
85% - Email
95% - Event, Email
100% - Event, Email

Figure 77 home quota

User Folder Redirection Configuration:

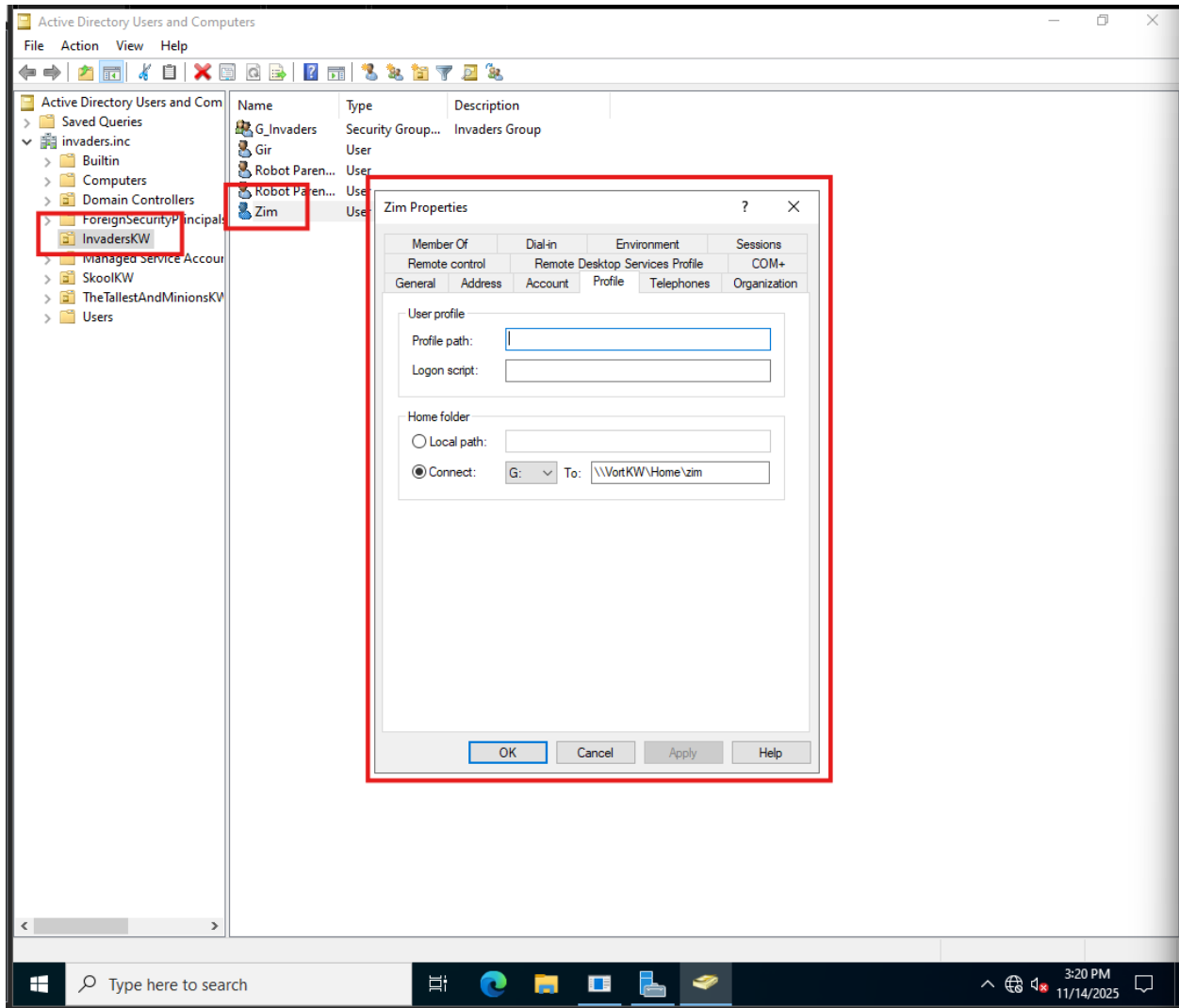


Figure 78 Proof after configuring user folder redirection

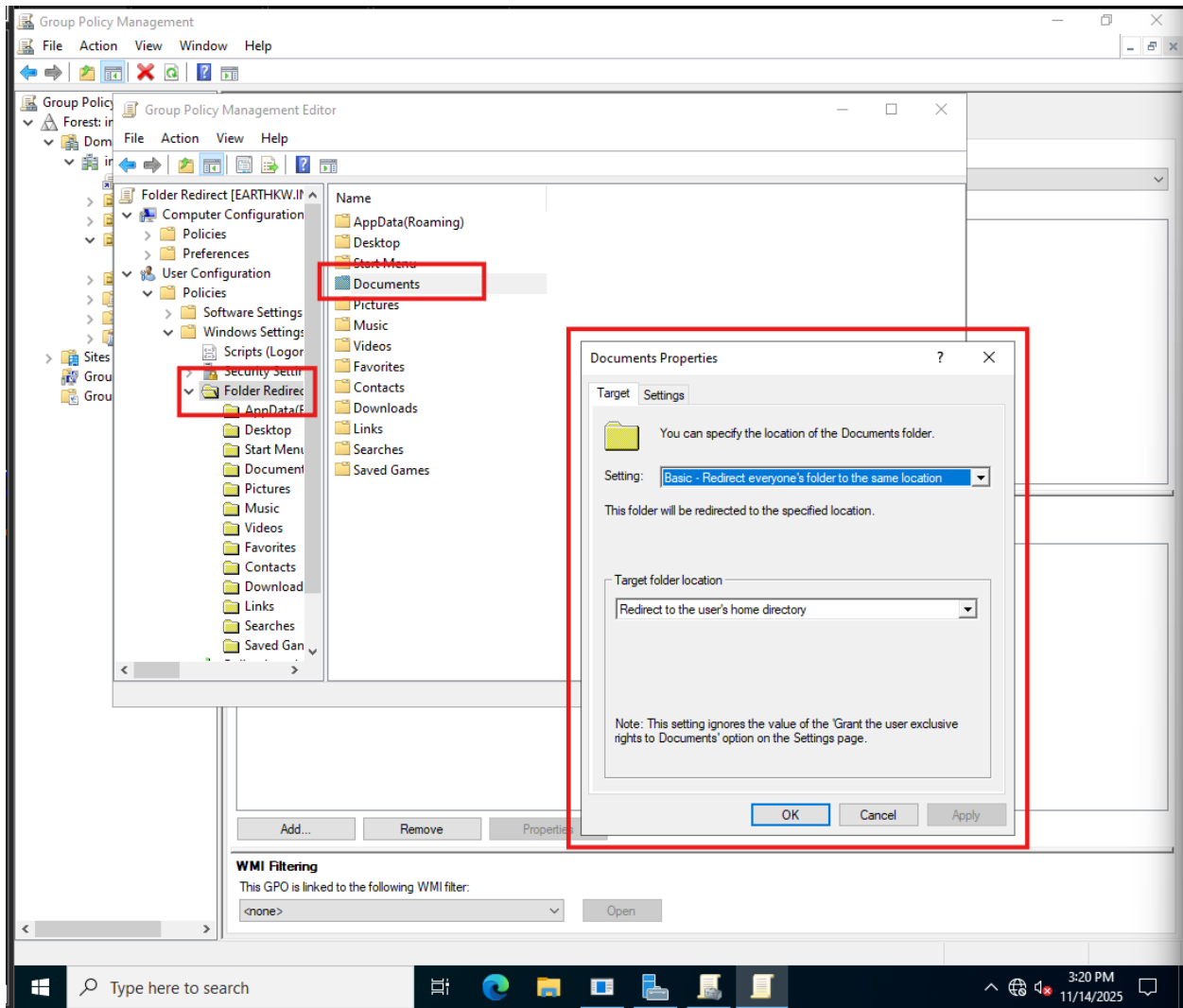


Figure 79 GPO configuring document folder redirection

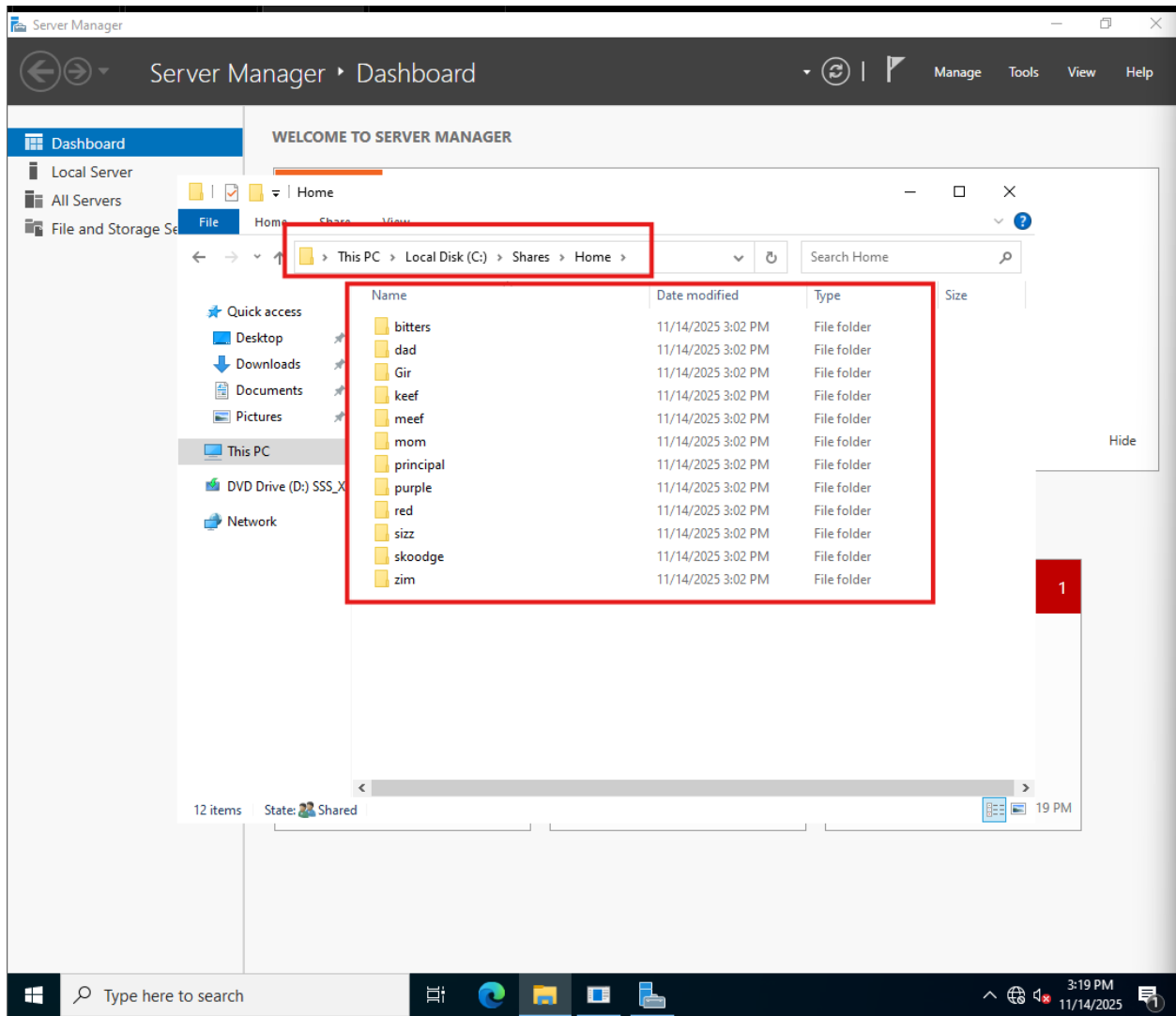


Figure 80 all the user shares created by prior settings

Group Policy Configuration:

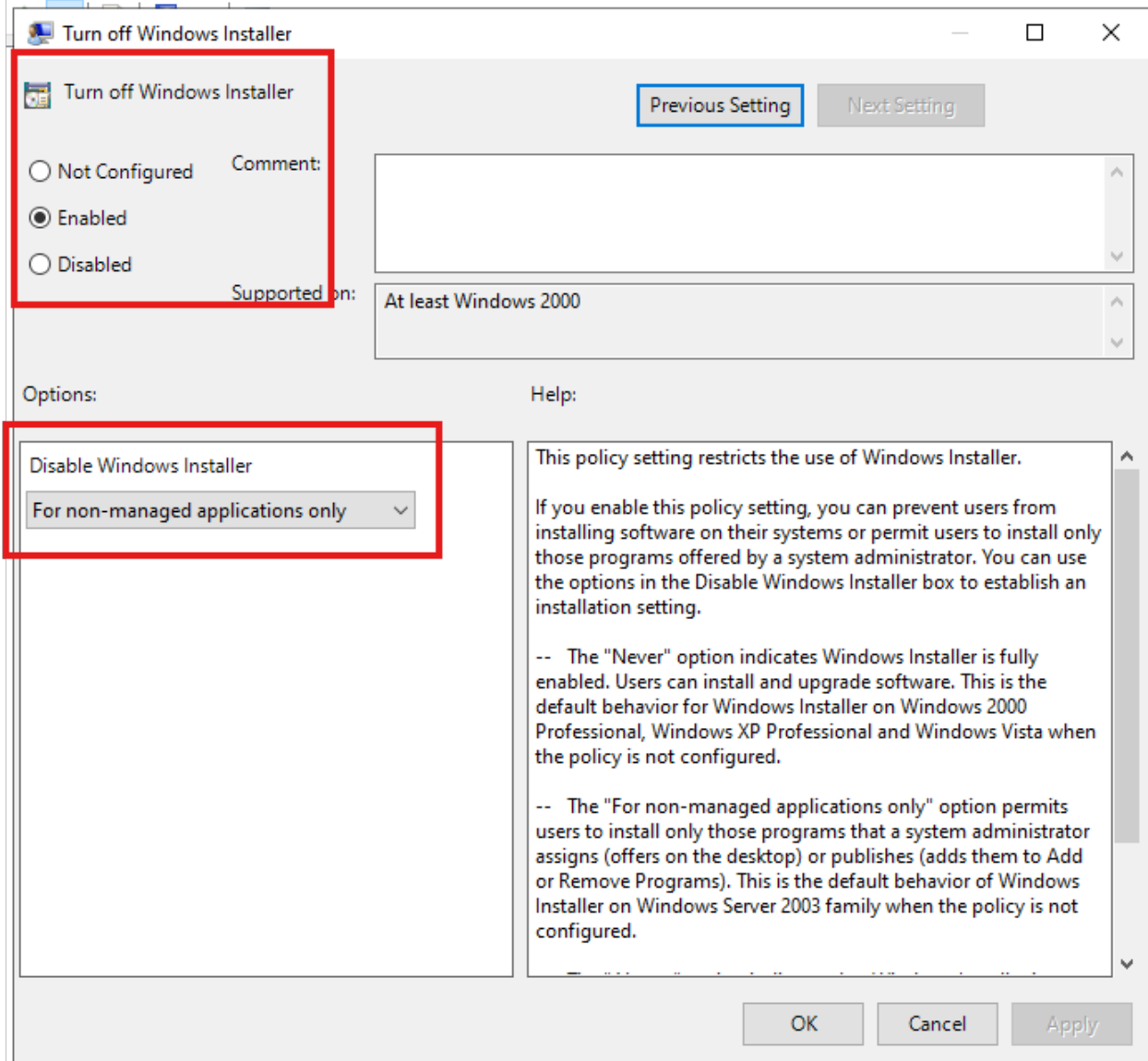


Figure 81 Do not allow the user to install software

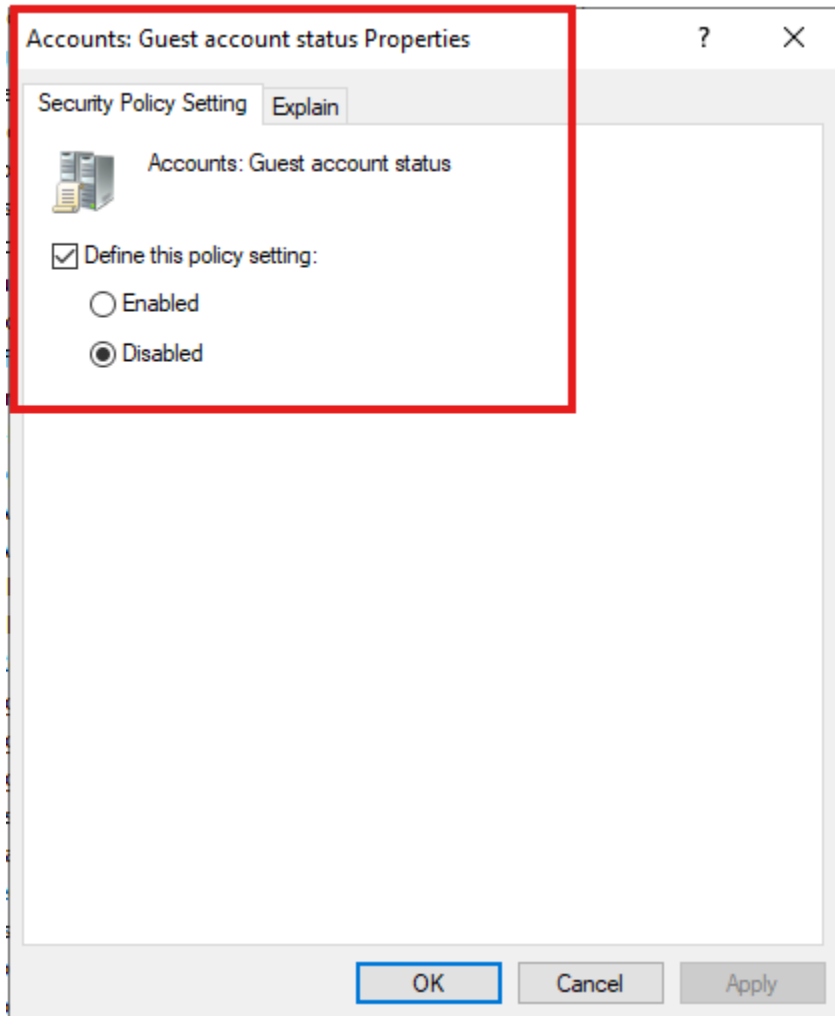


Figure 82 Disable the guest account

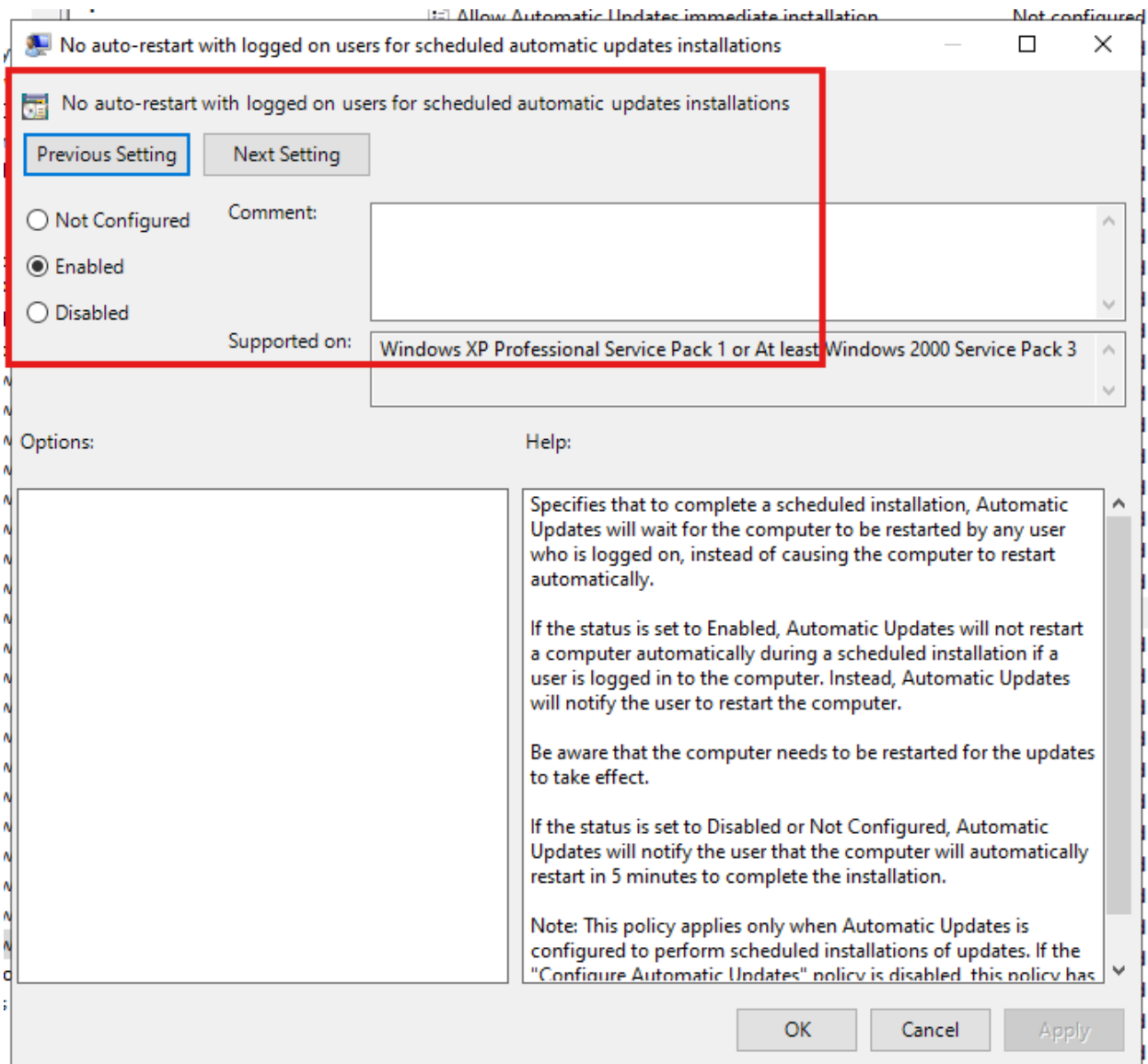


Figure 83 Disable forced system restarts

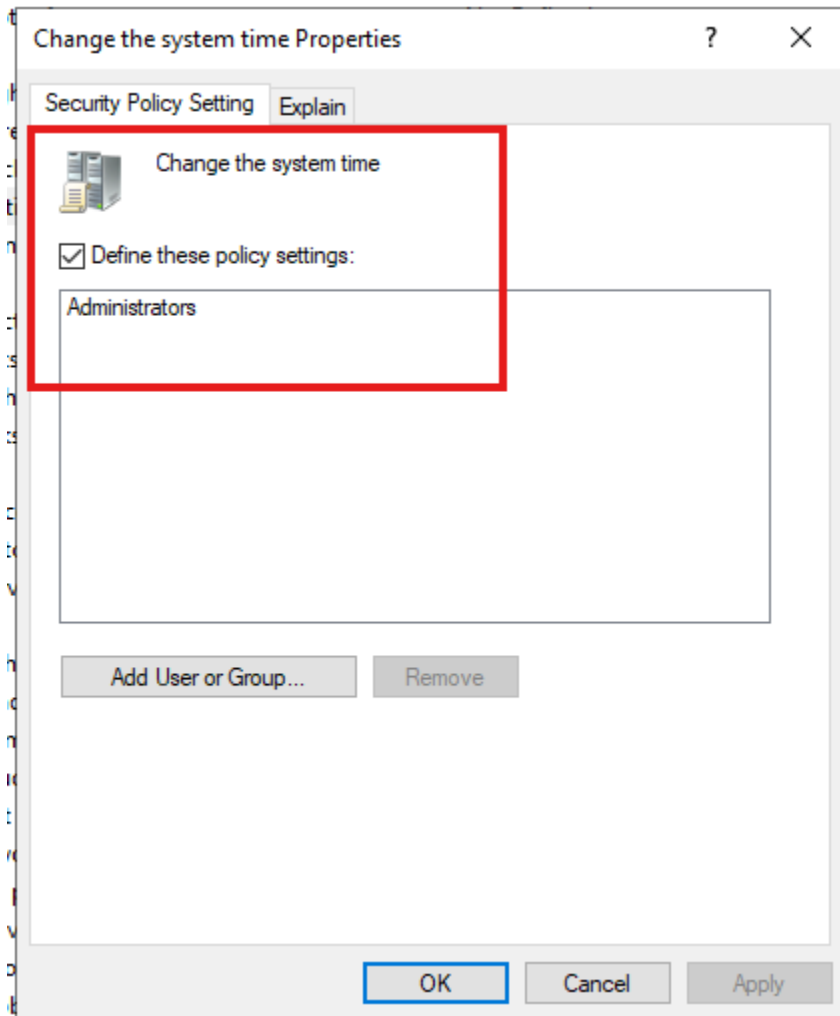


Figure 84 Prevent users from changing the system time, but allow them to view the calendar

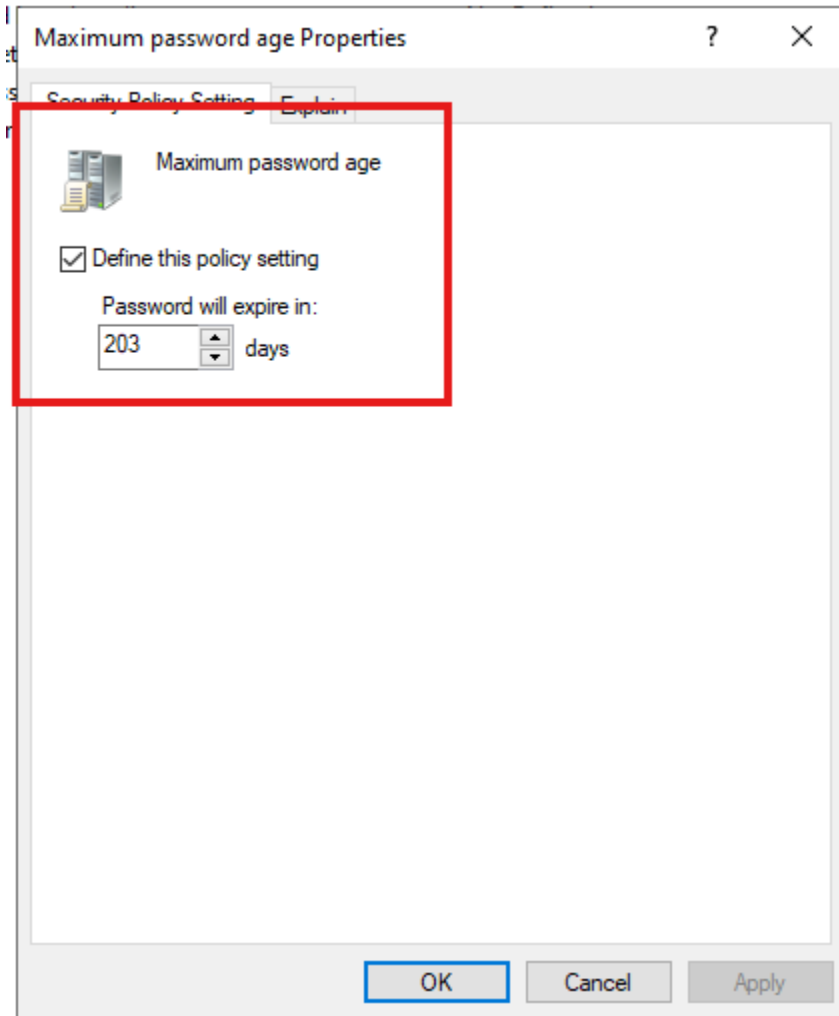


Figure 85 Set password expiration to 203 days

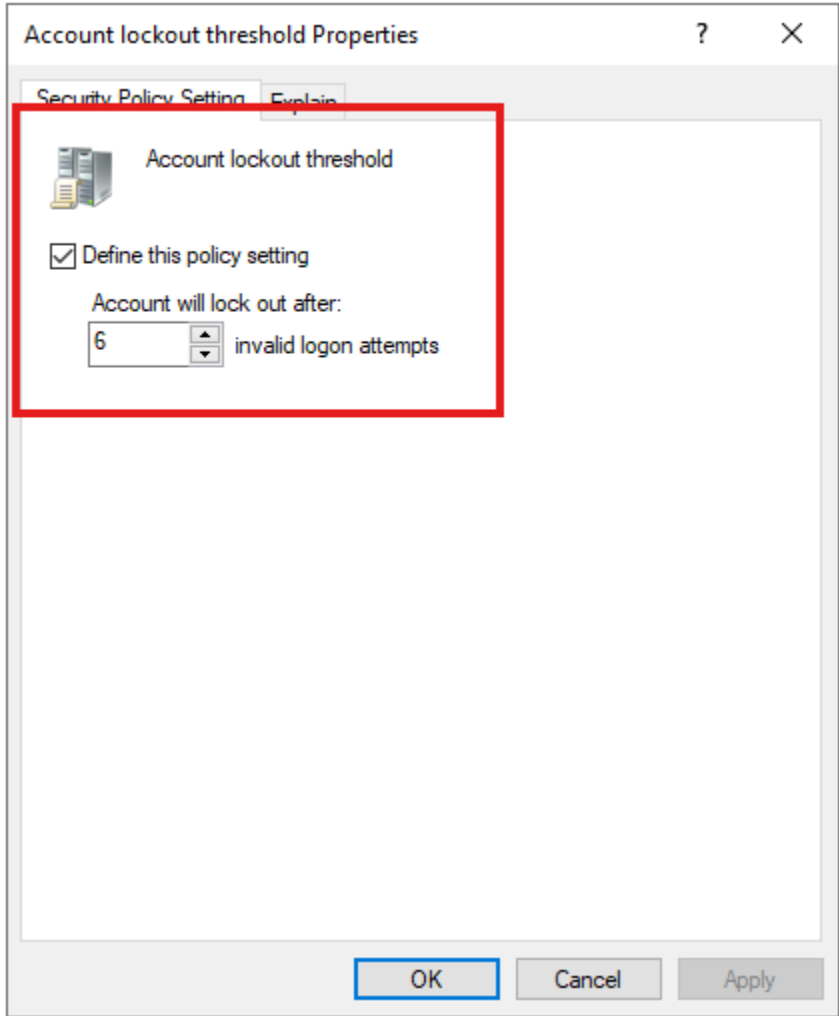


Figure 86 Allow users 6 attempts before locking their accounts

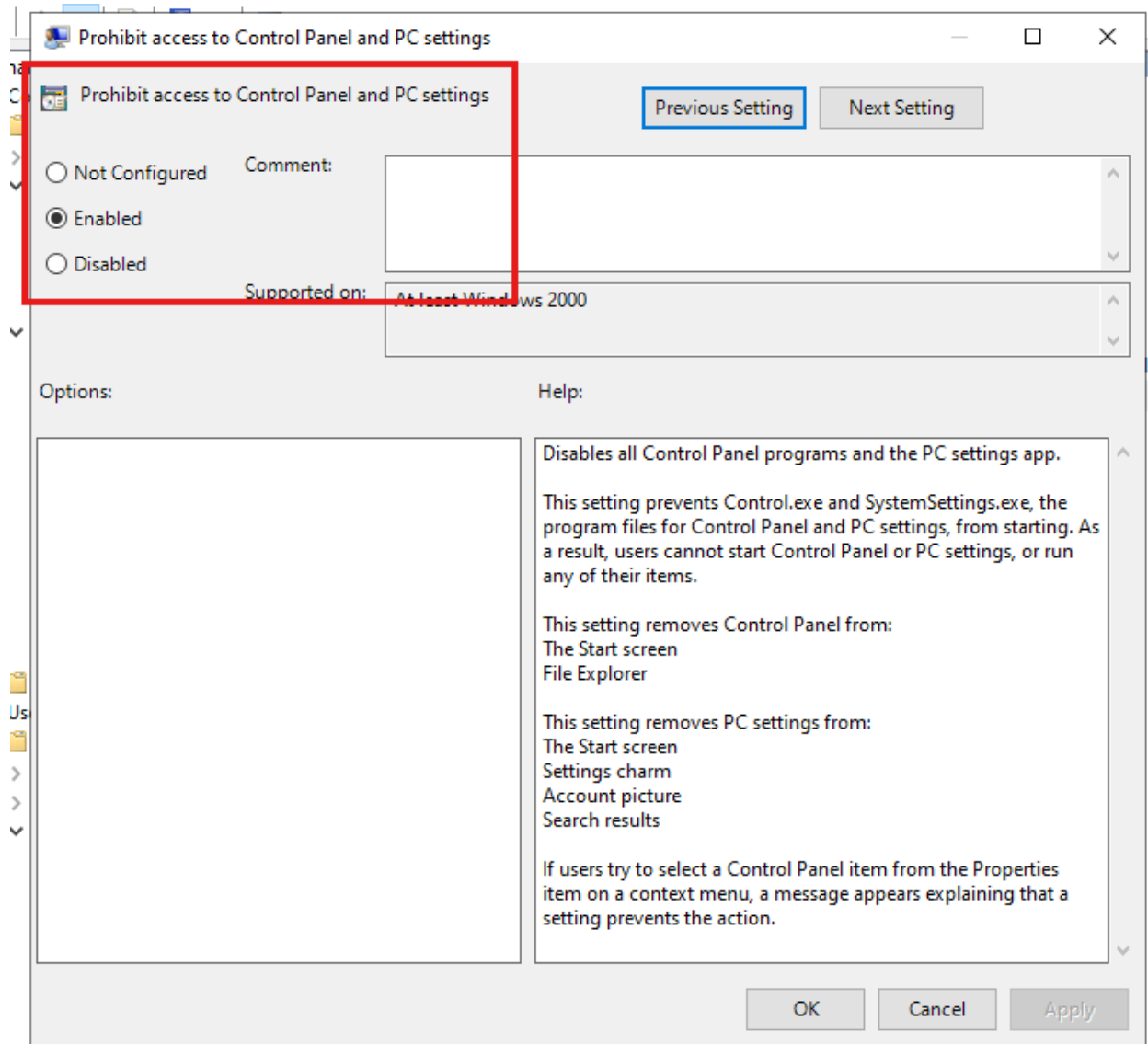


Figure 87 Disable access to control panel

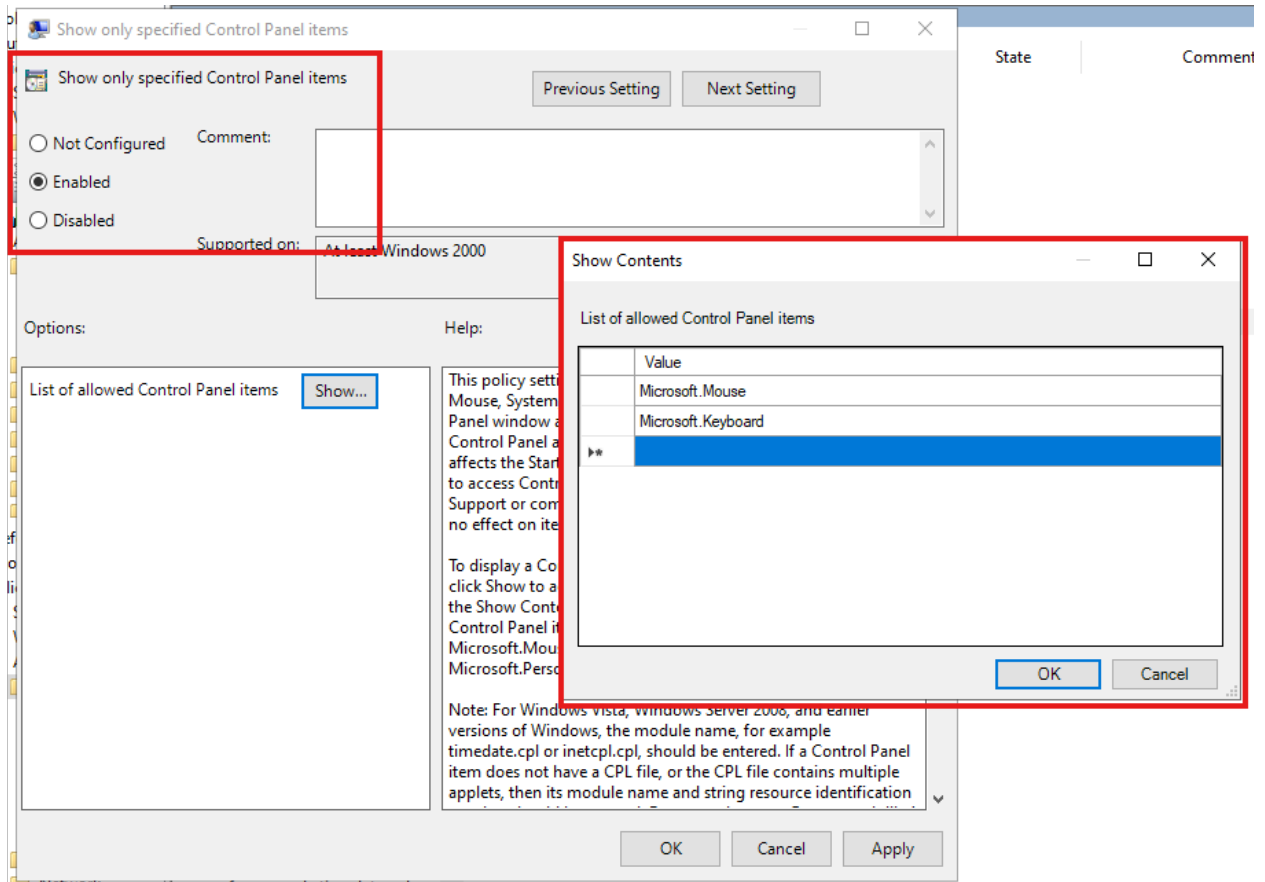


Figure 88 Whitelist mouse and keyboard control panel applications

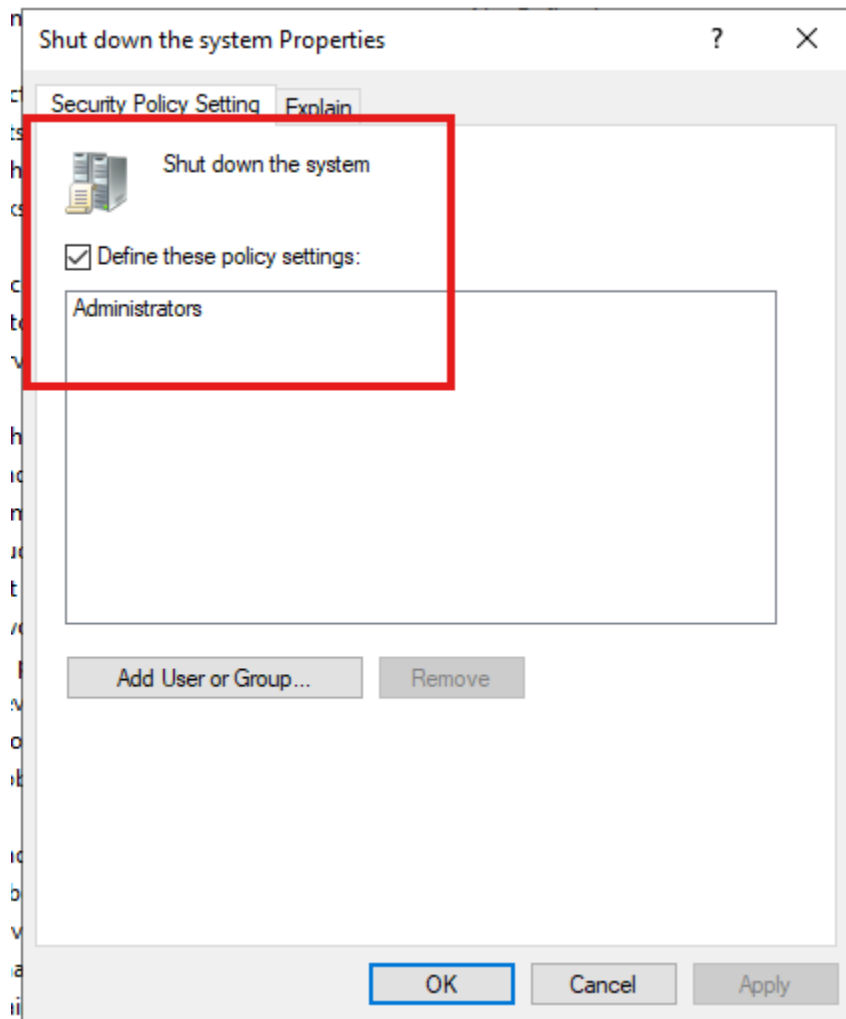


Figure 89 Prevent users from shutting down the system

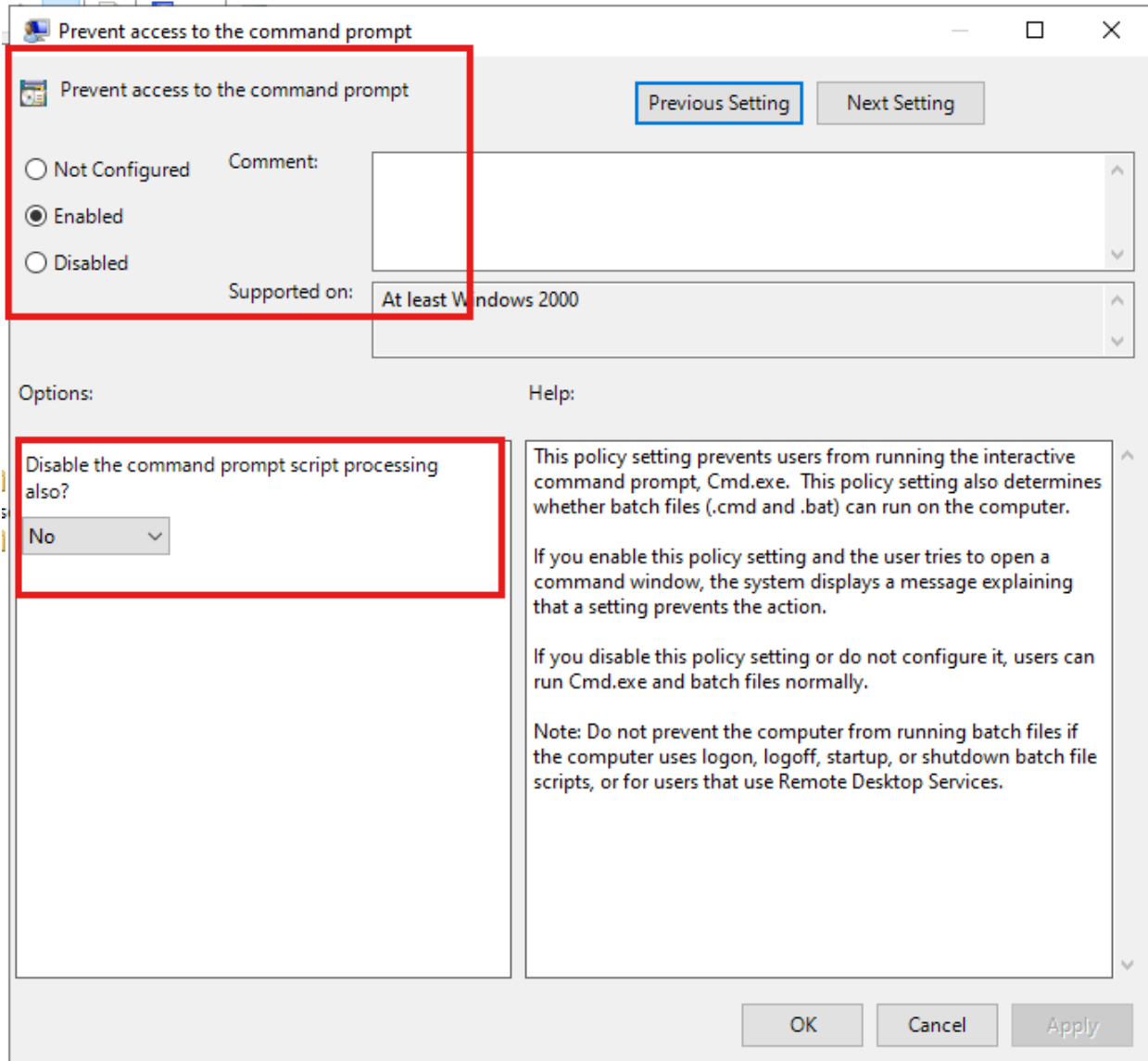


Figure 90 Remove access to the command prompt

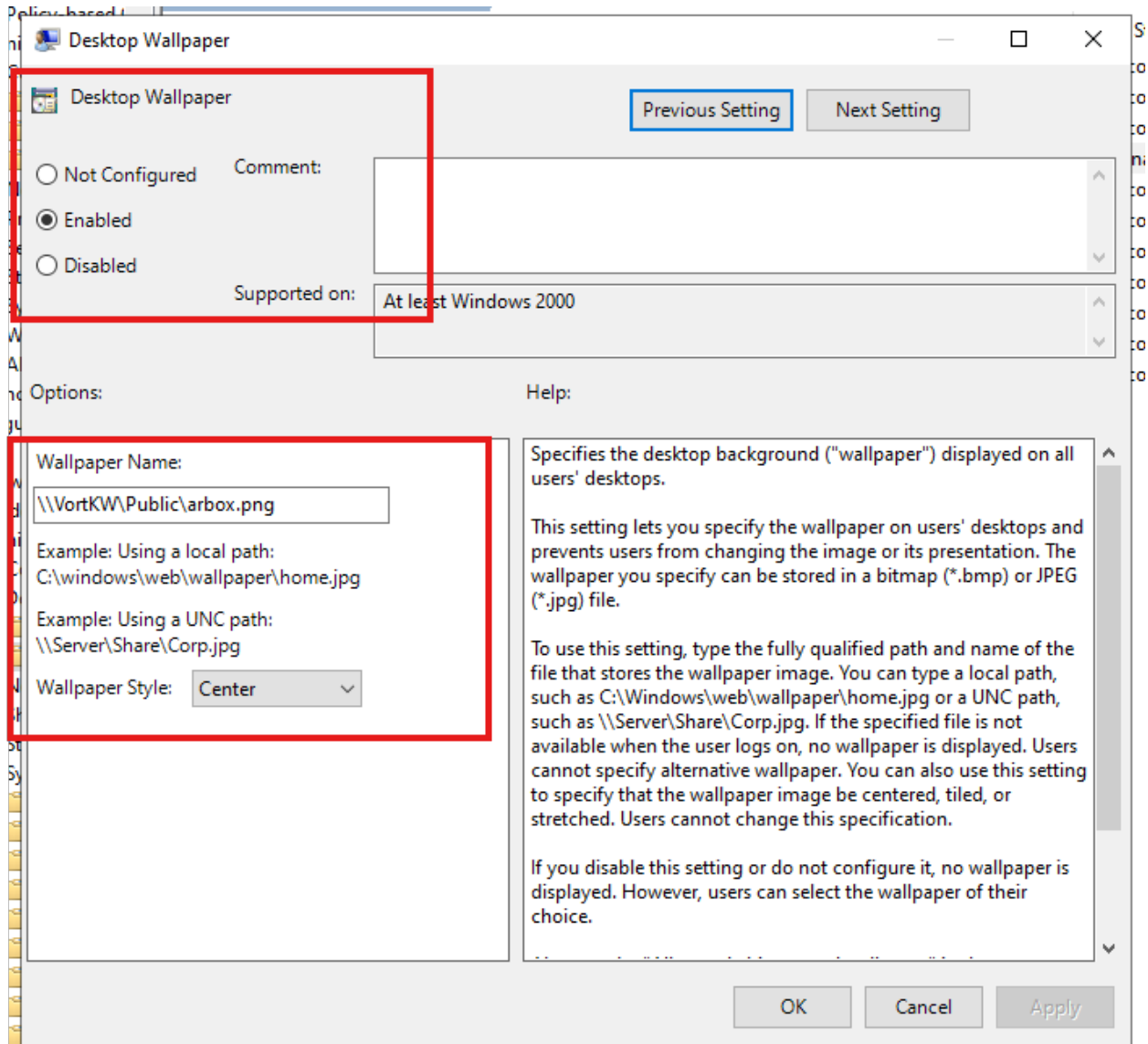


Figure 91 Force change the user background

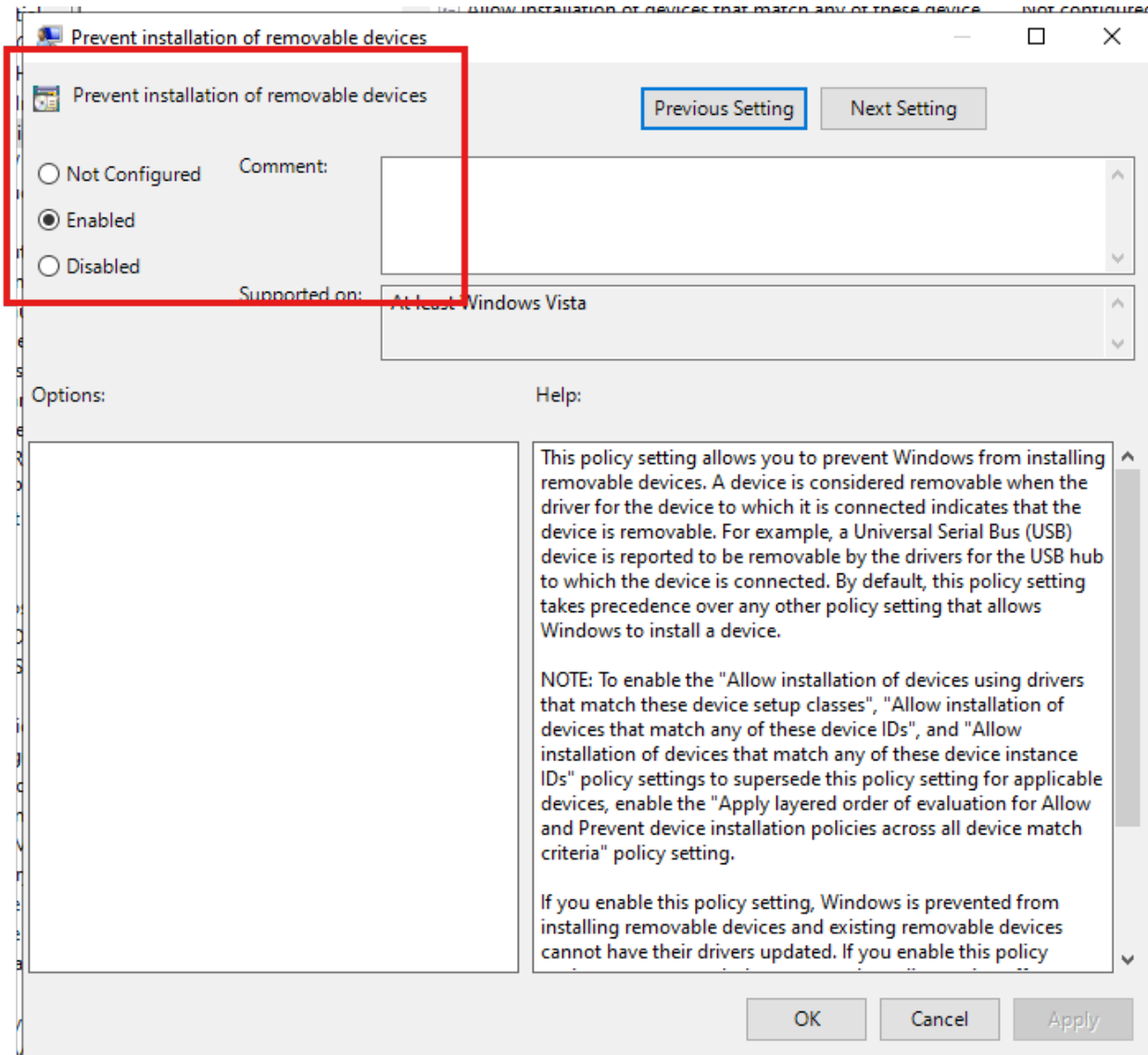


Figure 92 Disable USB devices

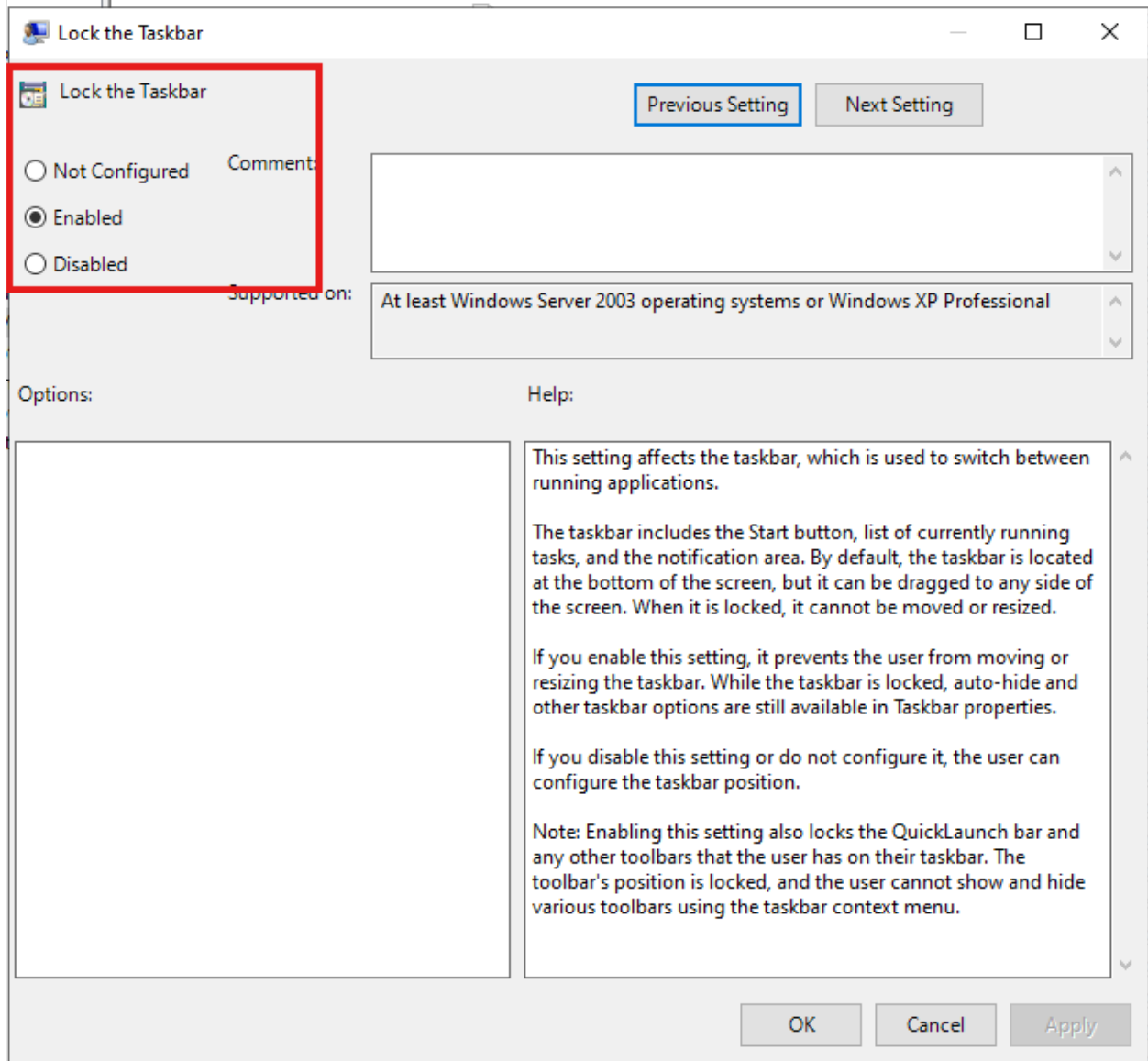


Figure 93 Force lock the taskbar

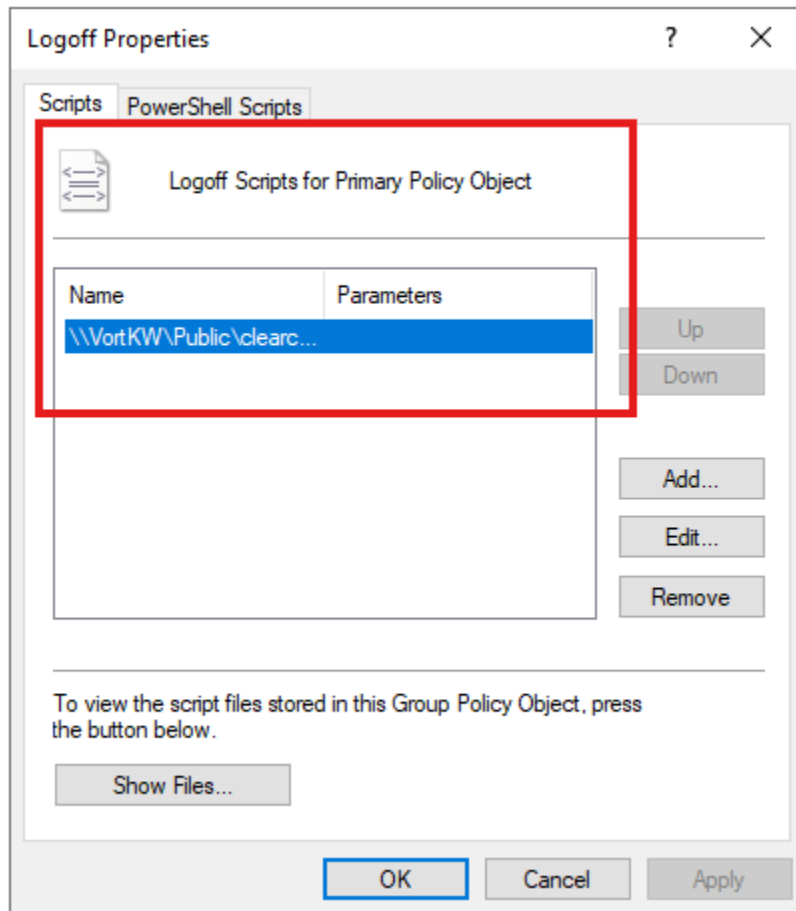


Figure 94 Clear the chrome cache on shutdown with a bat script

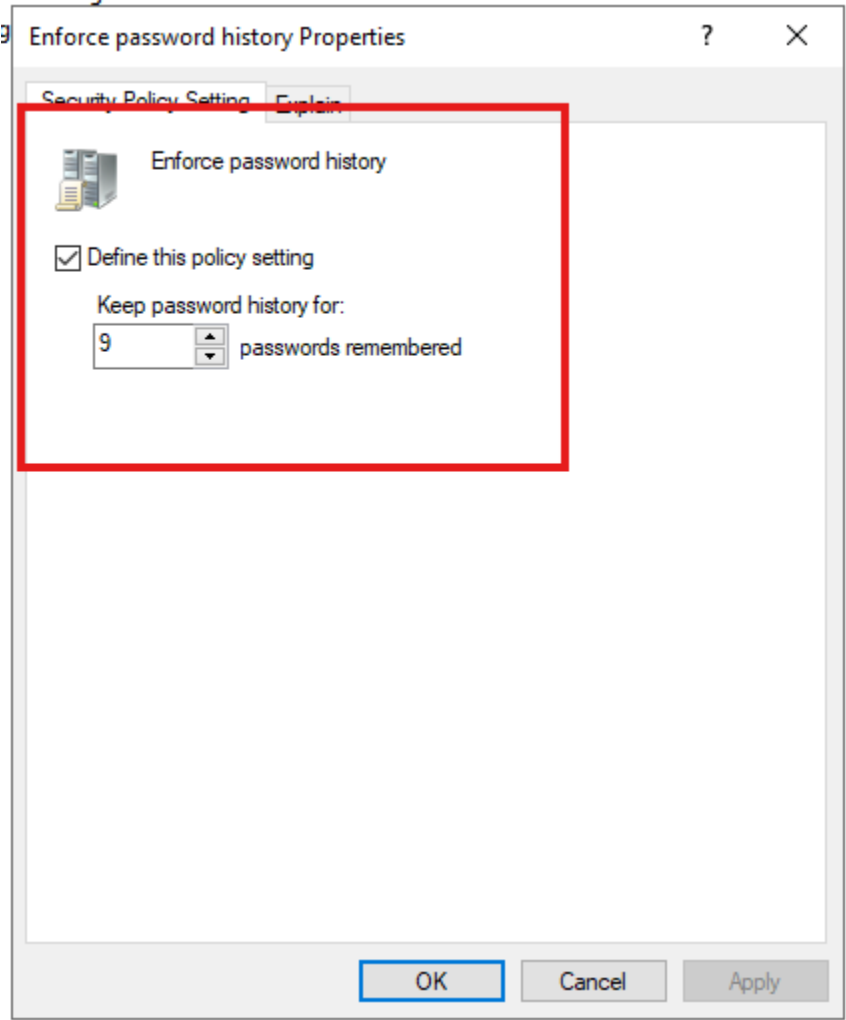


Figure 95 Set password history to 9

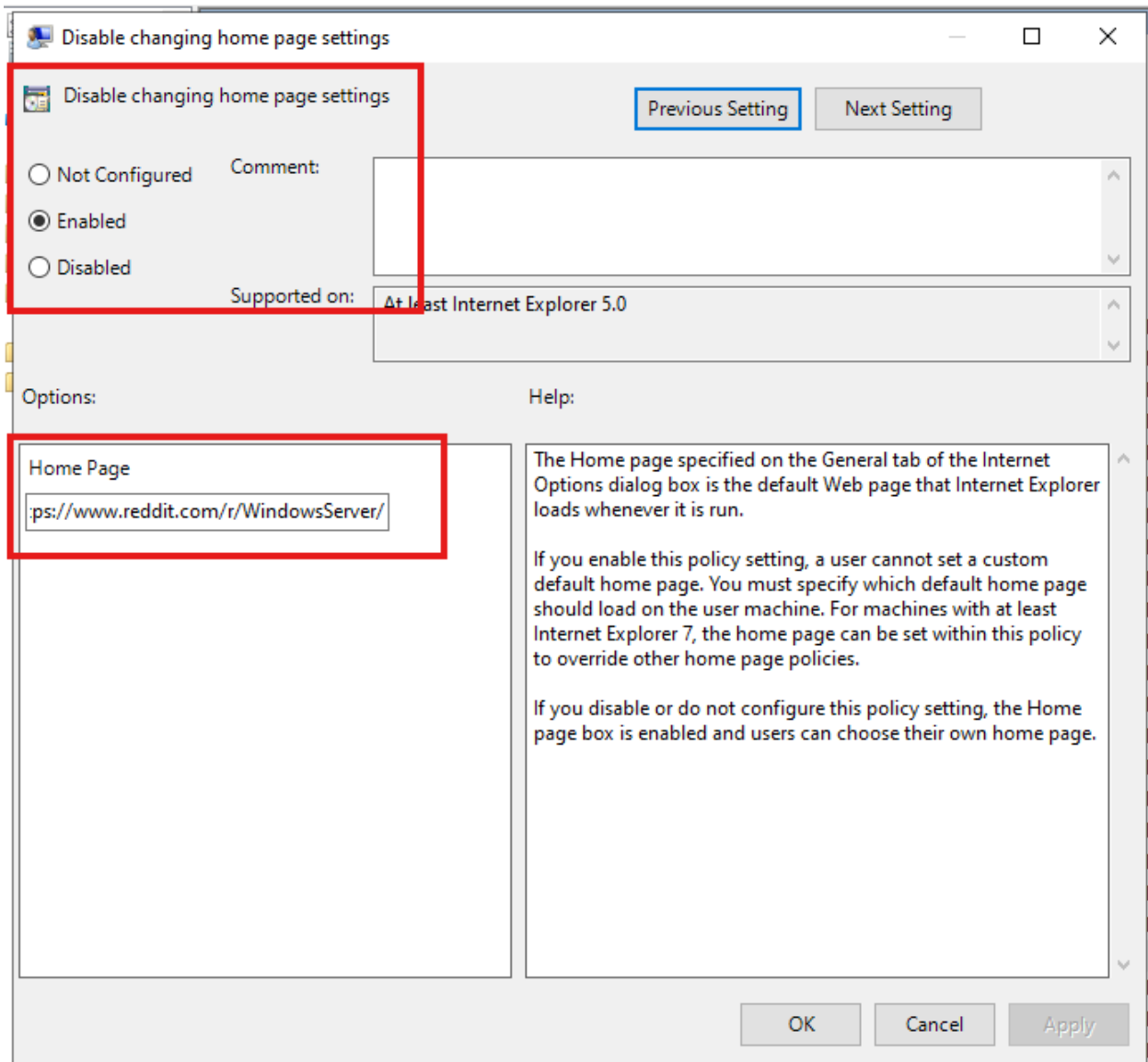


Figure 96 Set the default webpage for Internet Explorer to r/WindowsServer

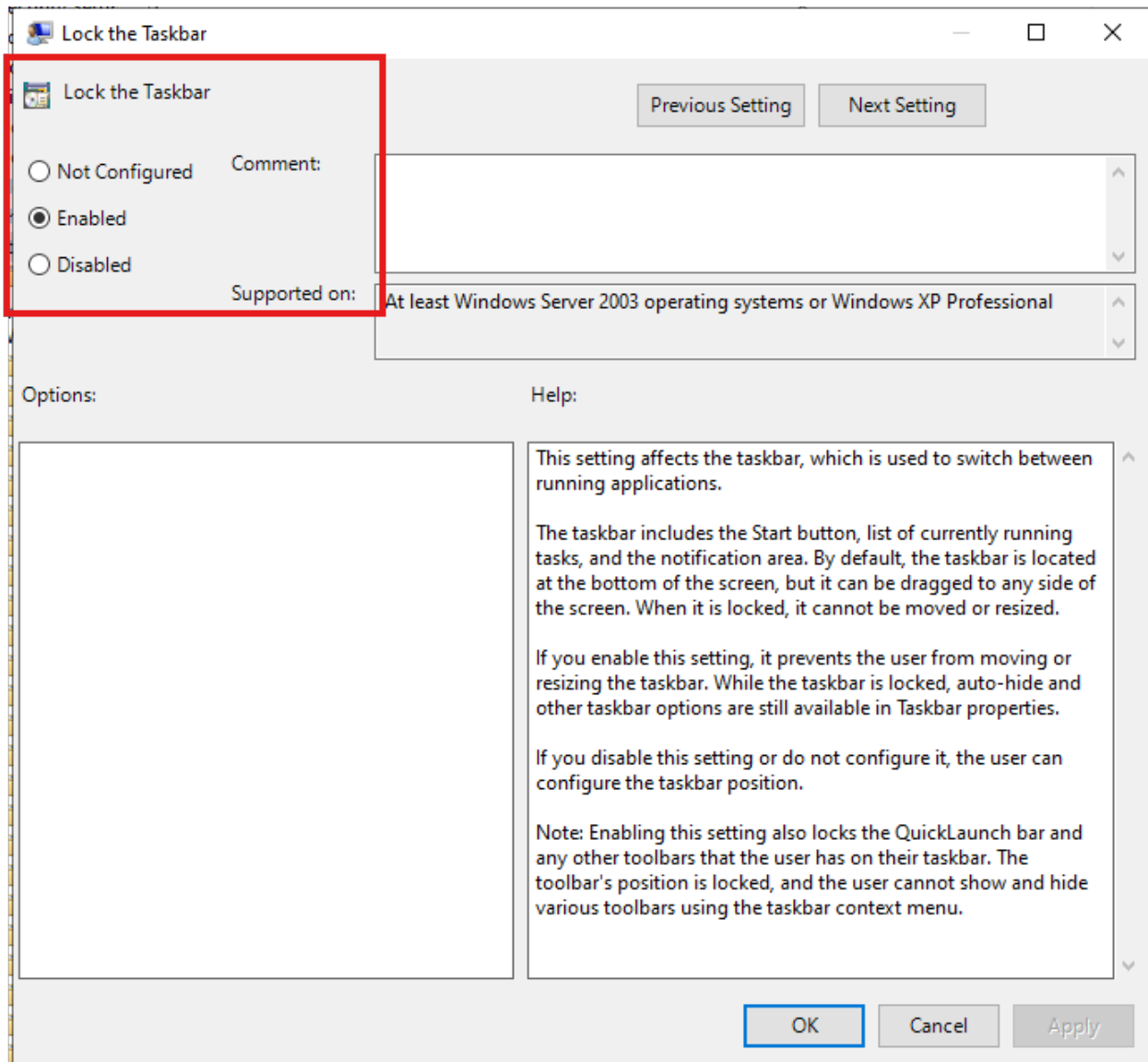


Figure 97 Lock the taskbar

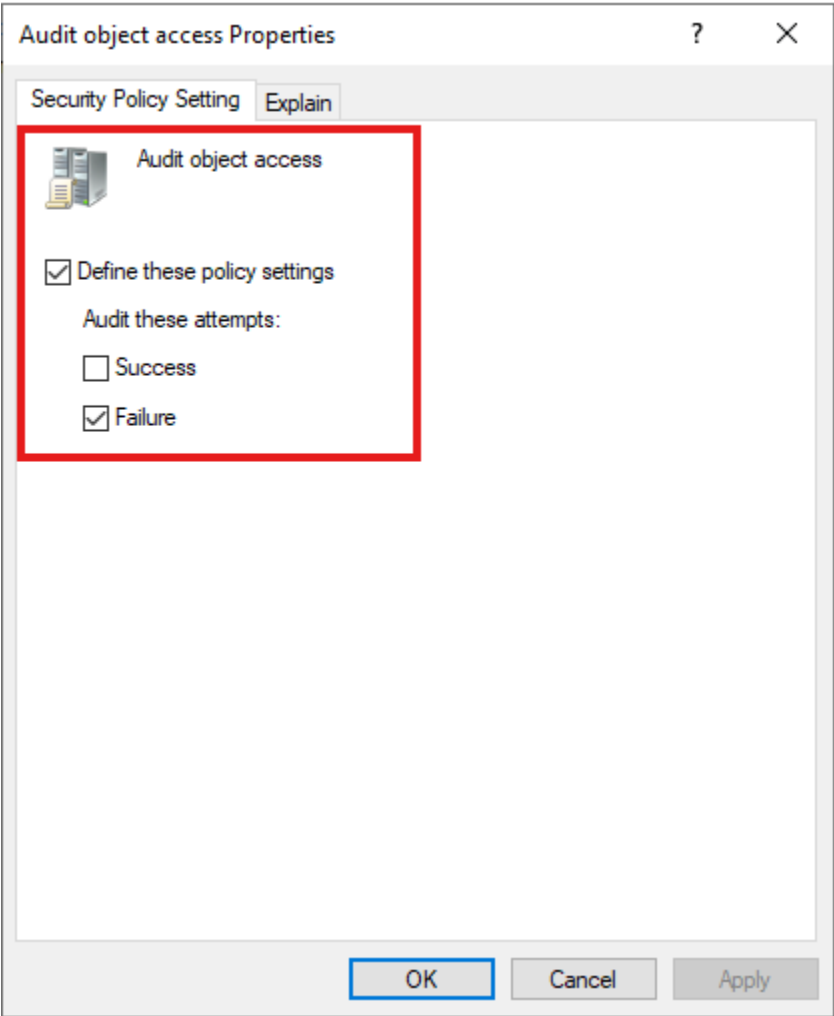


Figure 98 Audit object access for failure

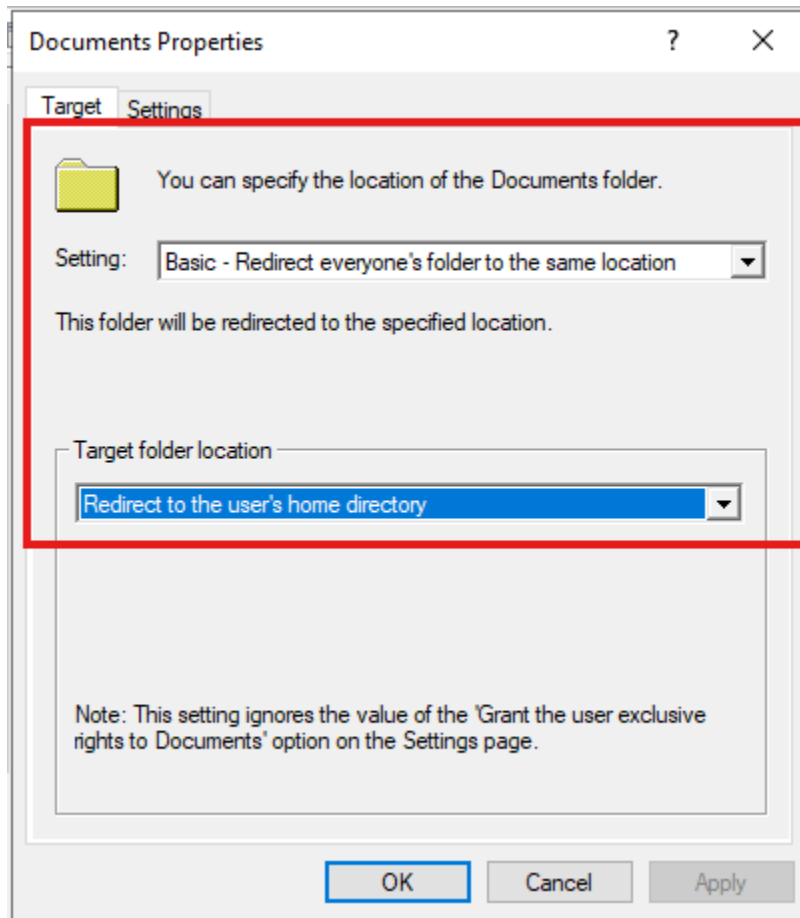


Figure 99 Redirect the documents folder (same as prior section)

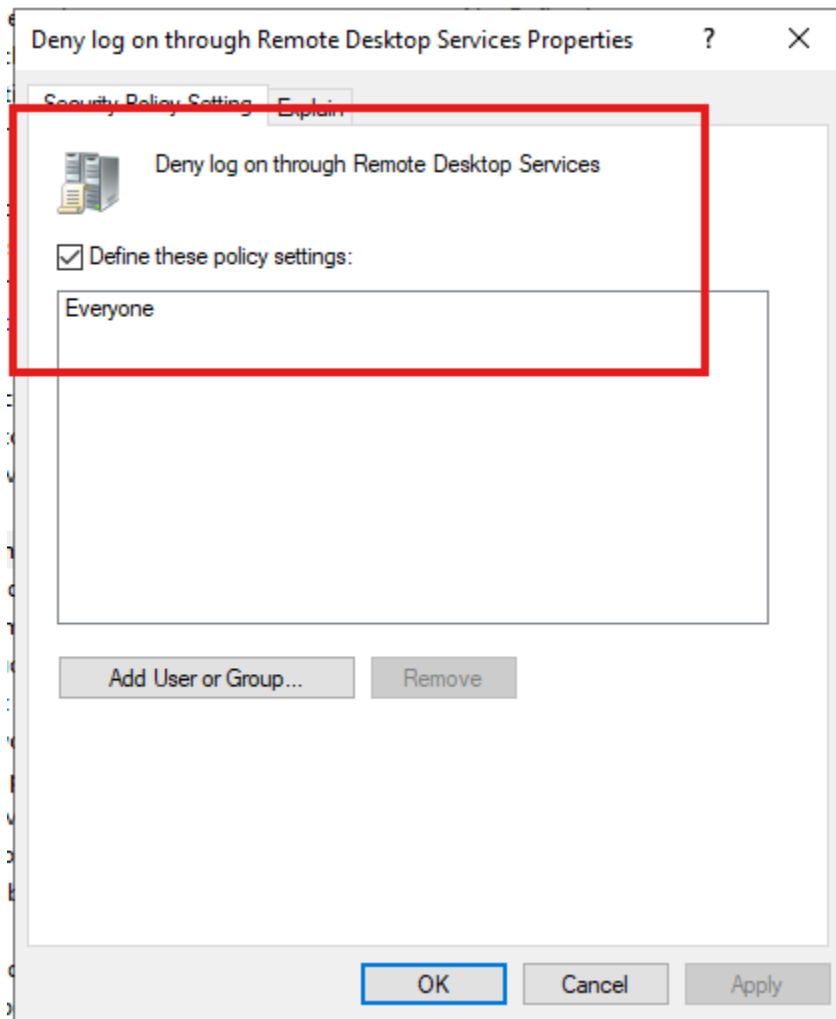


Figure 100 Deny logon through RDS

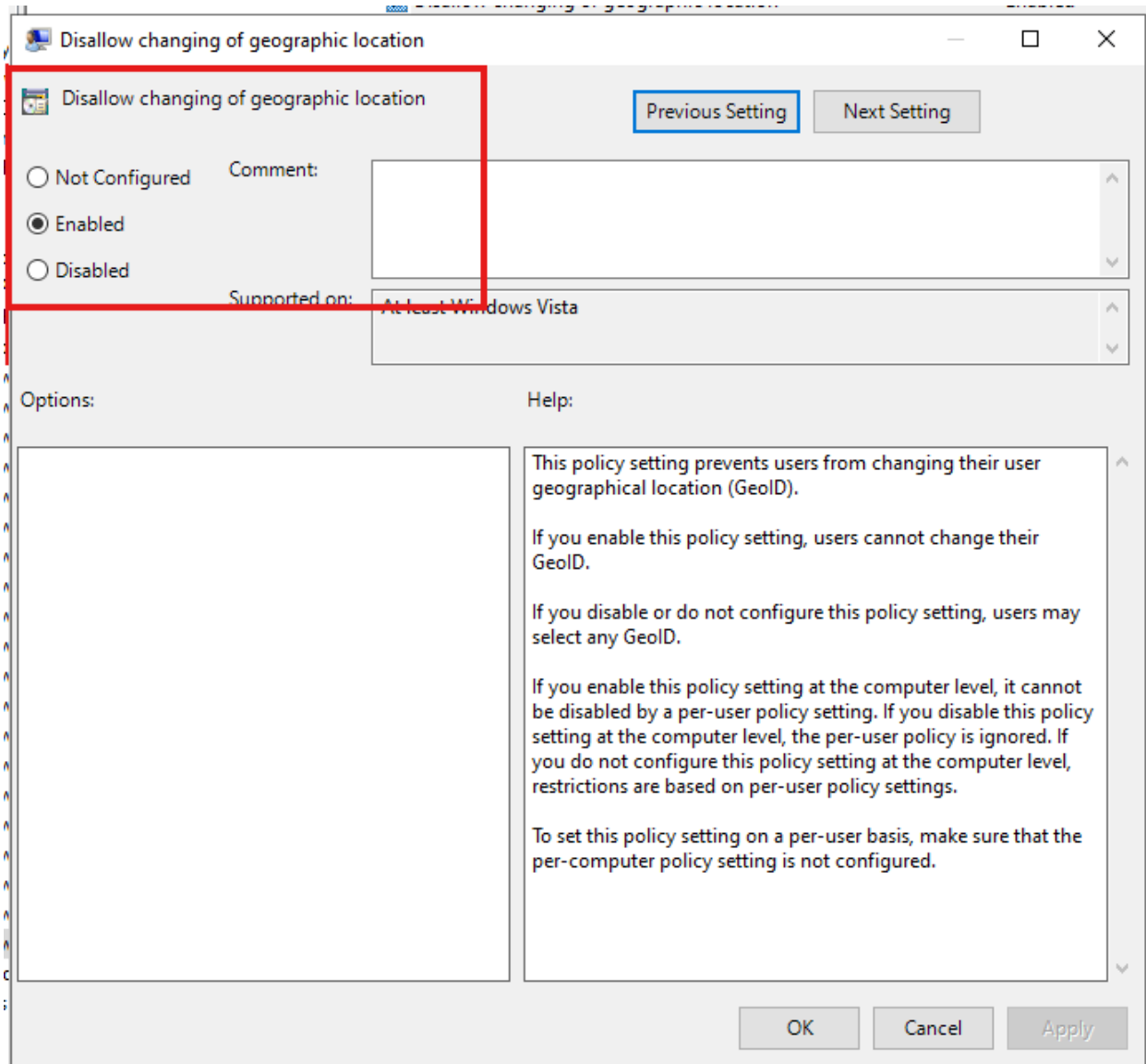


Figure 101 Disable changing geo location

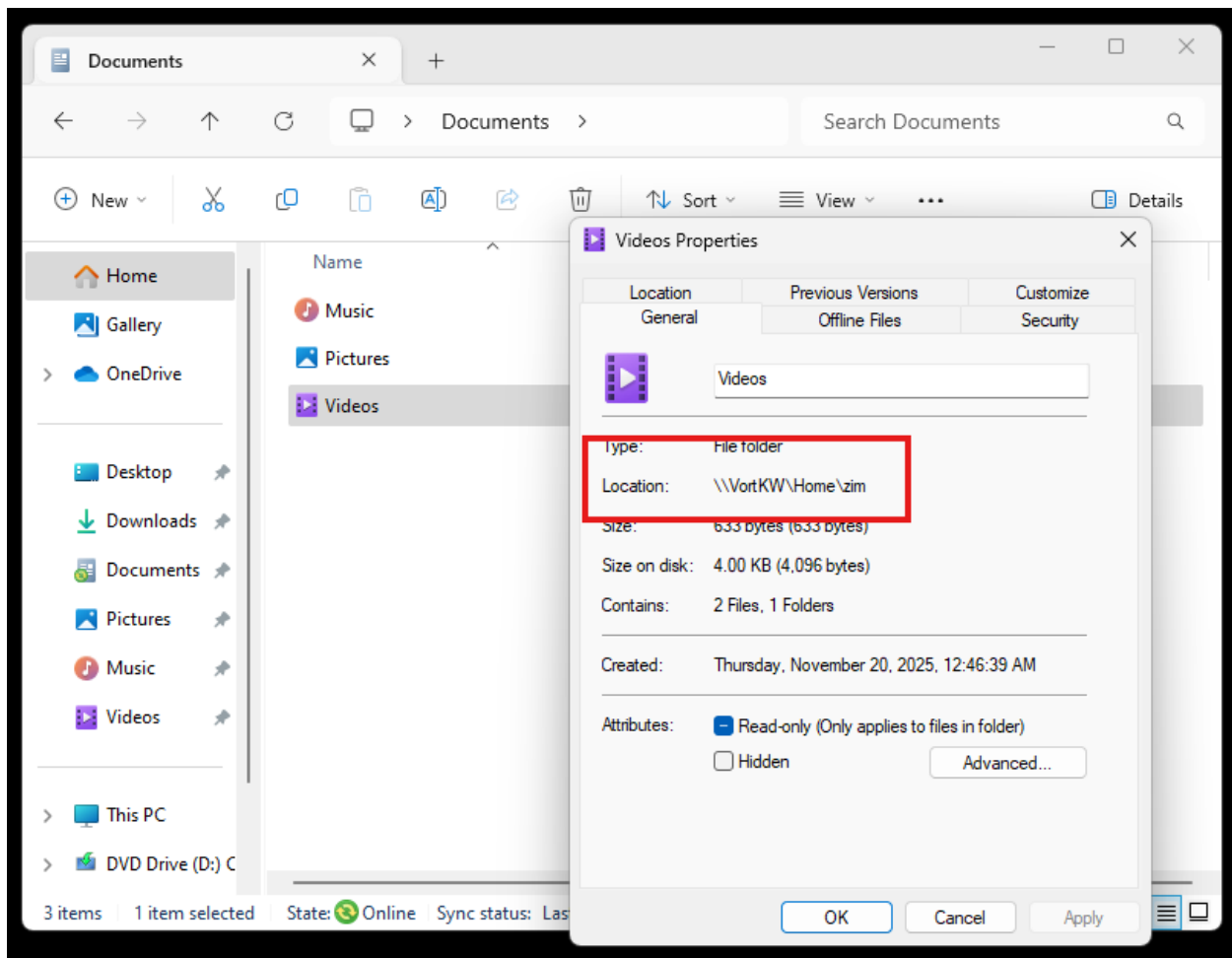


Figure 102 Proof of redirected documents folder

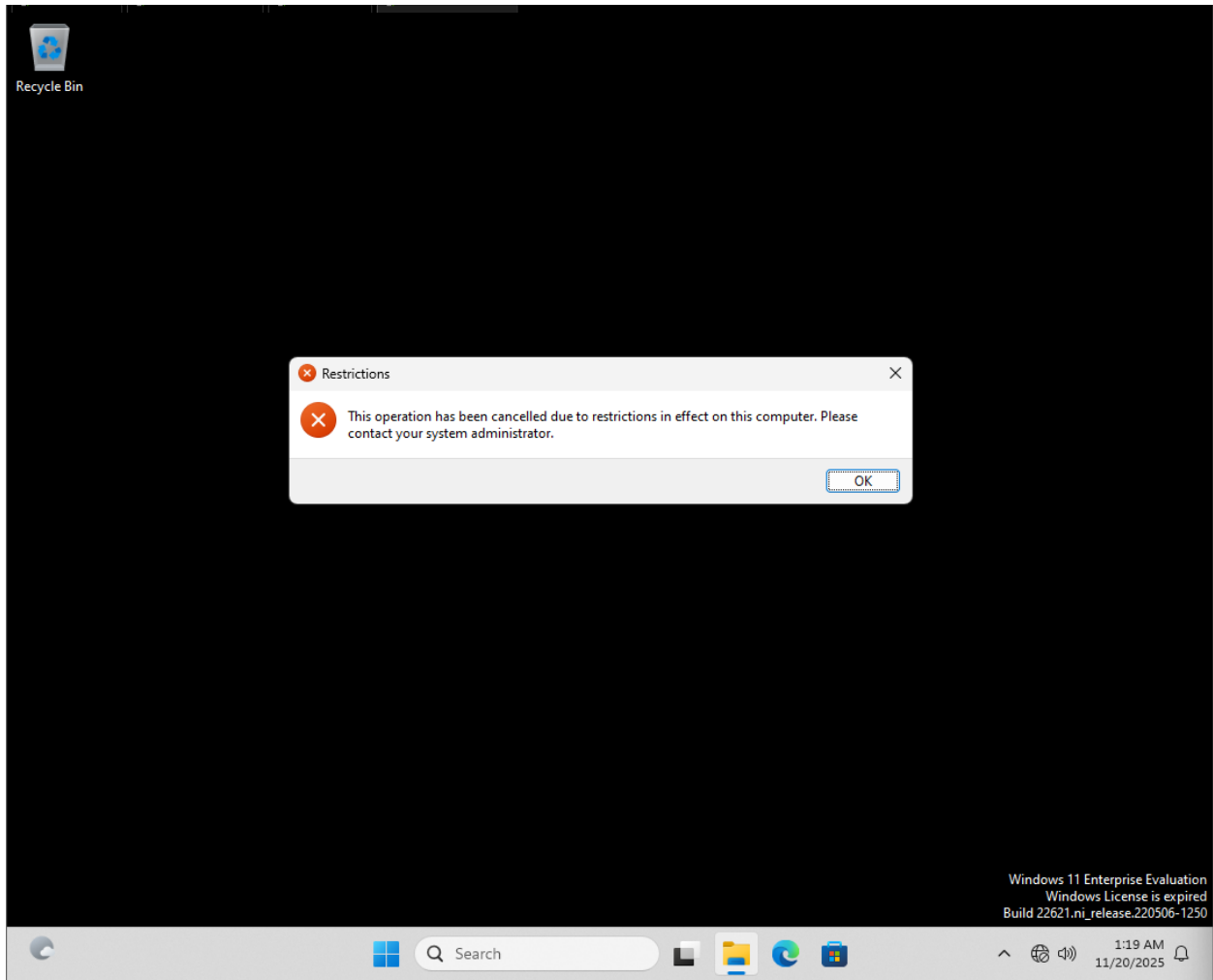


Figure 103 Proof of inaccessible control panel

Windows Admin Center Configuration:

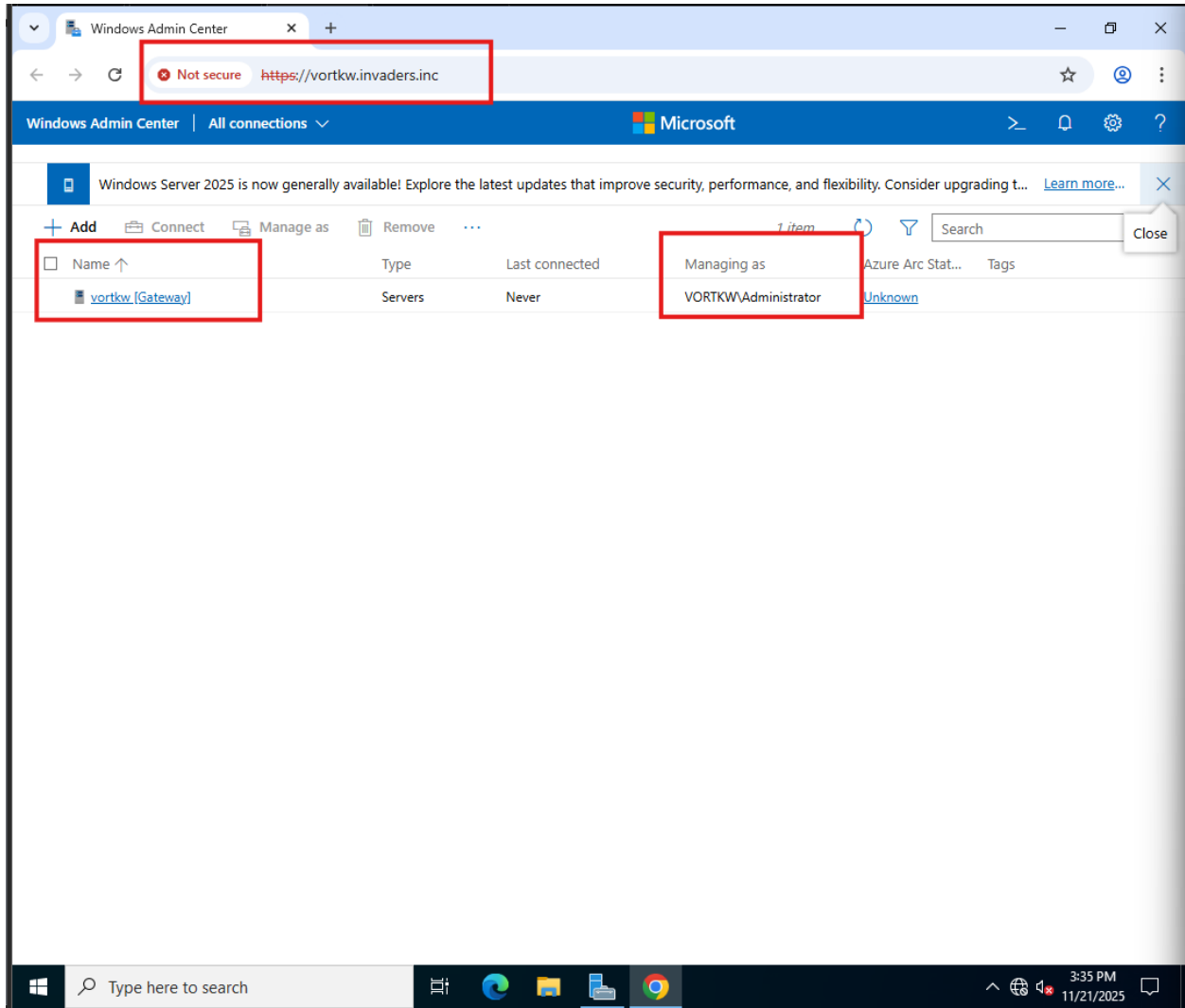


Figure 104 Proof of installed WAC

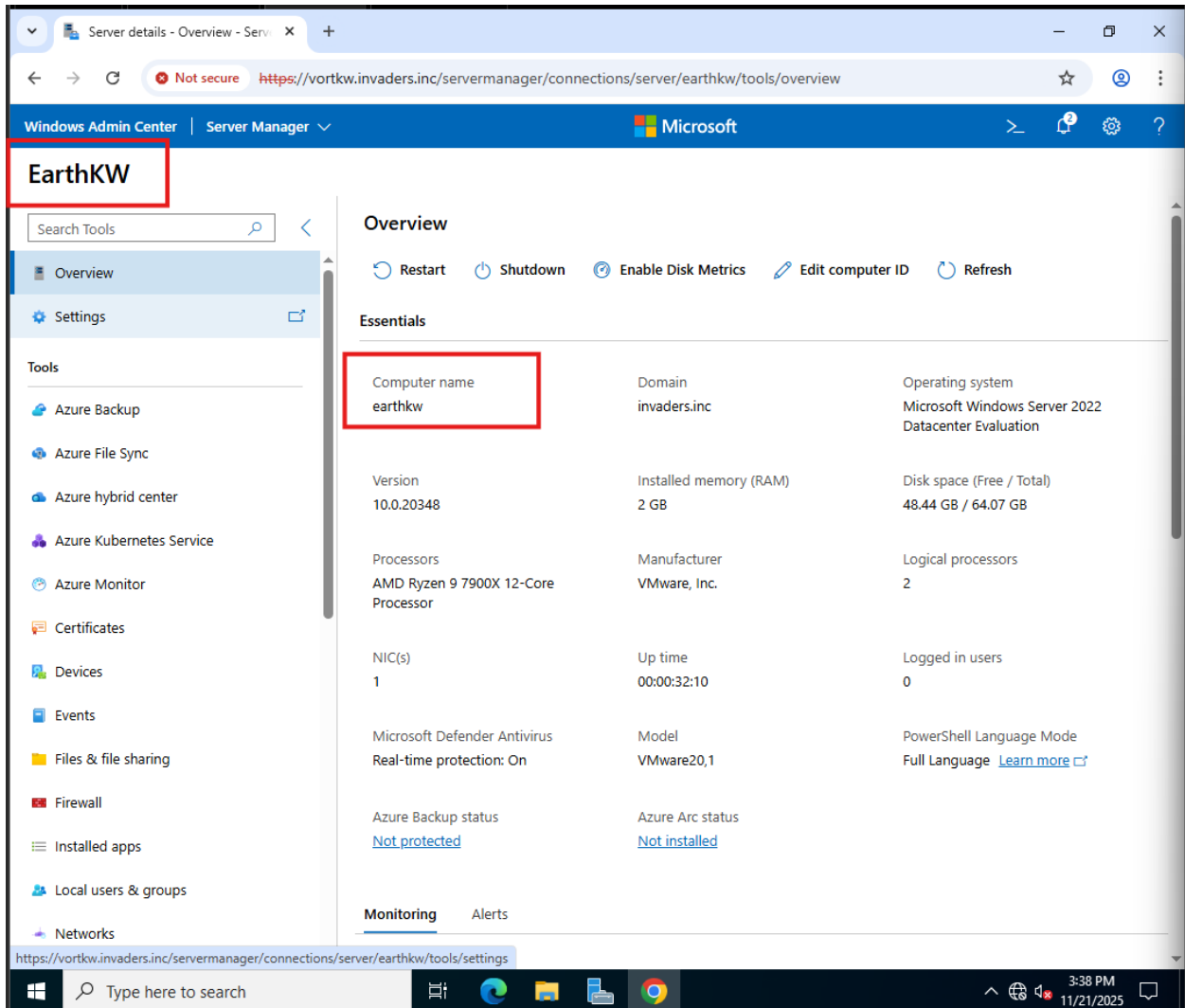


Figure 105 EarthKW configured and accessed through WAC on VortKW

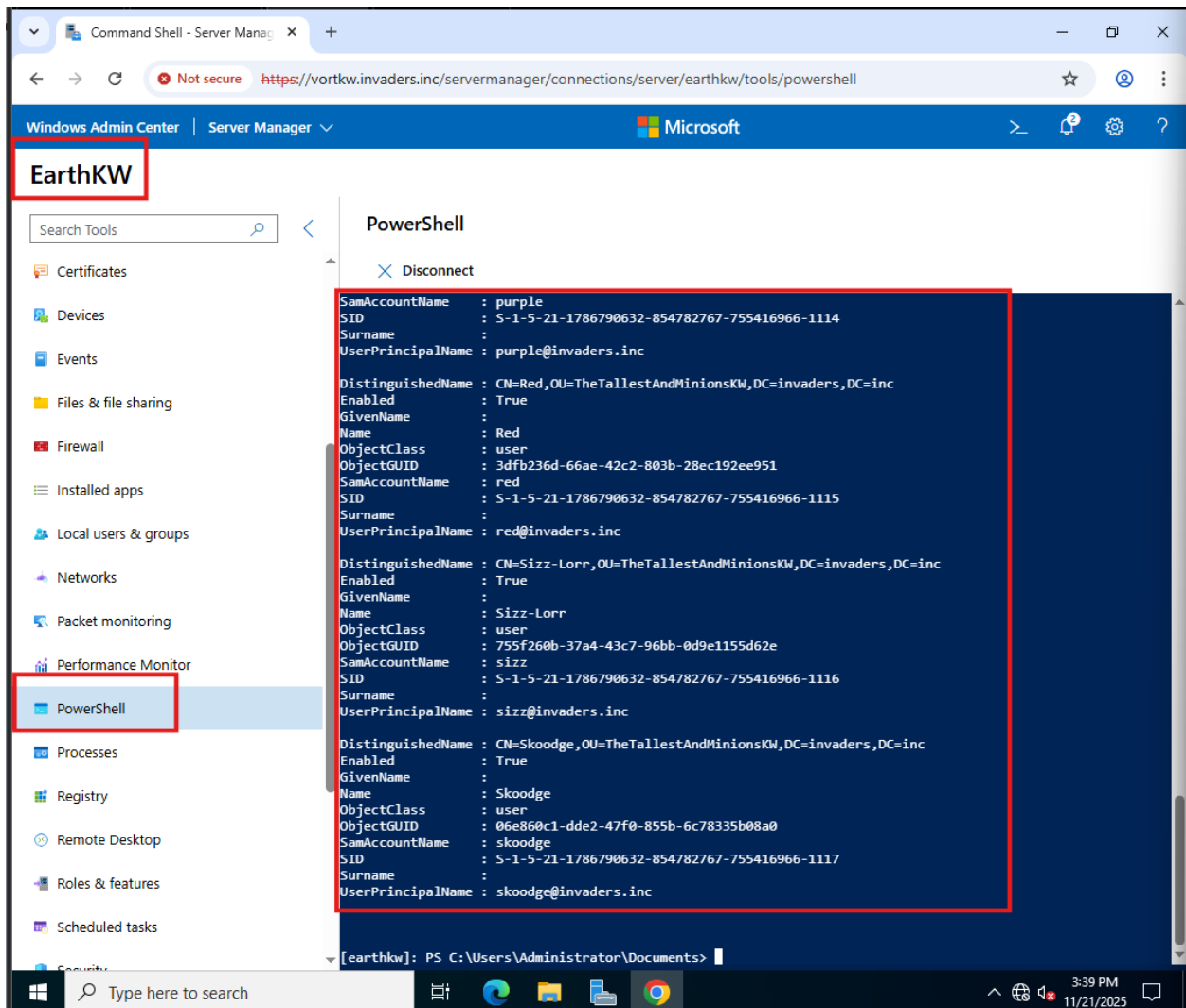


Figure 106 Powershell accessed on EarthKW through WAC

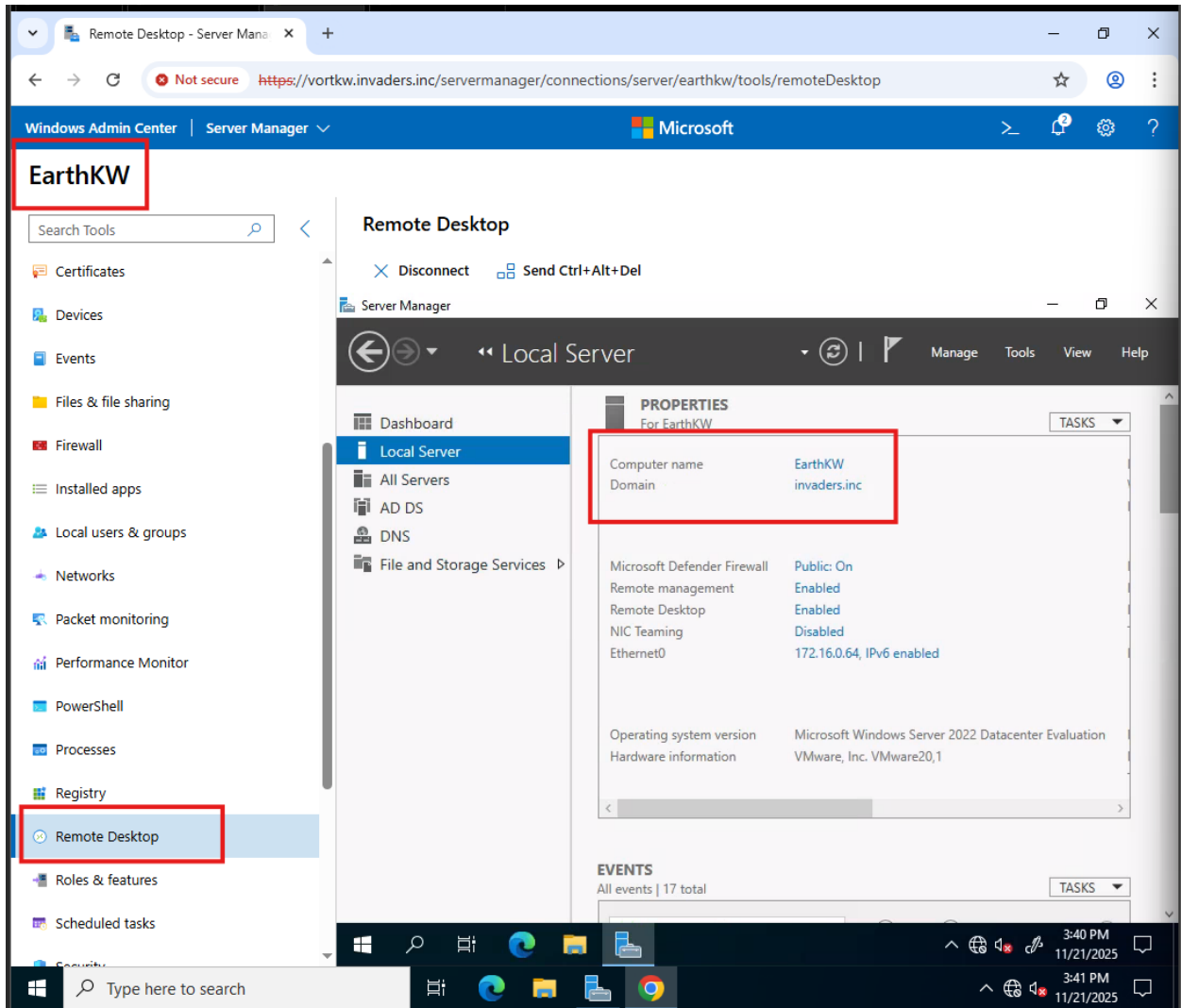


Figure 107 Remote Desktop accessed on EarthKW through WAC

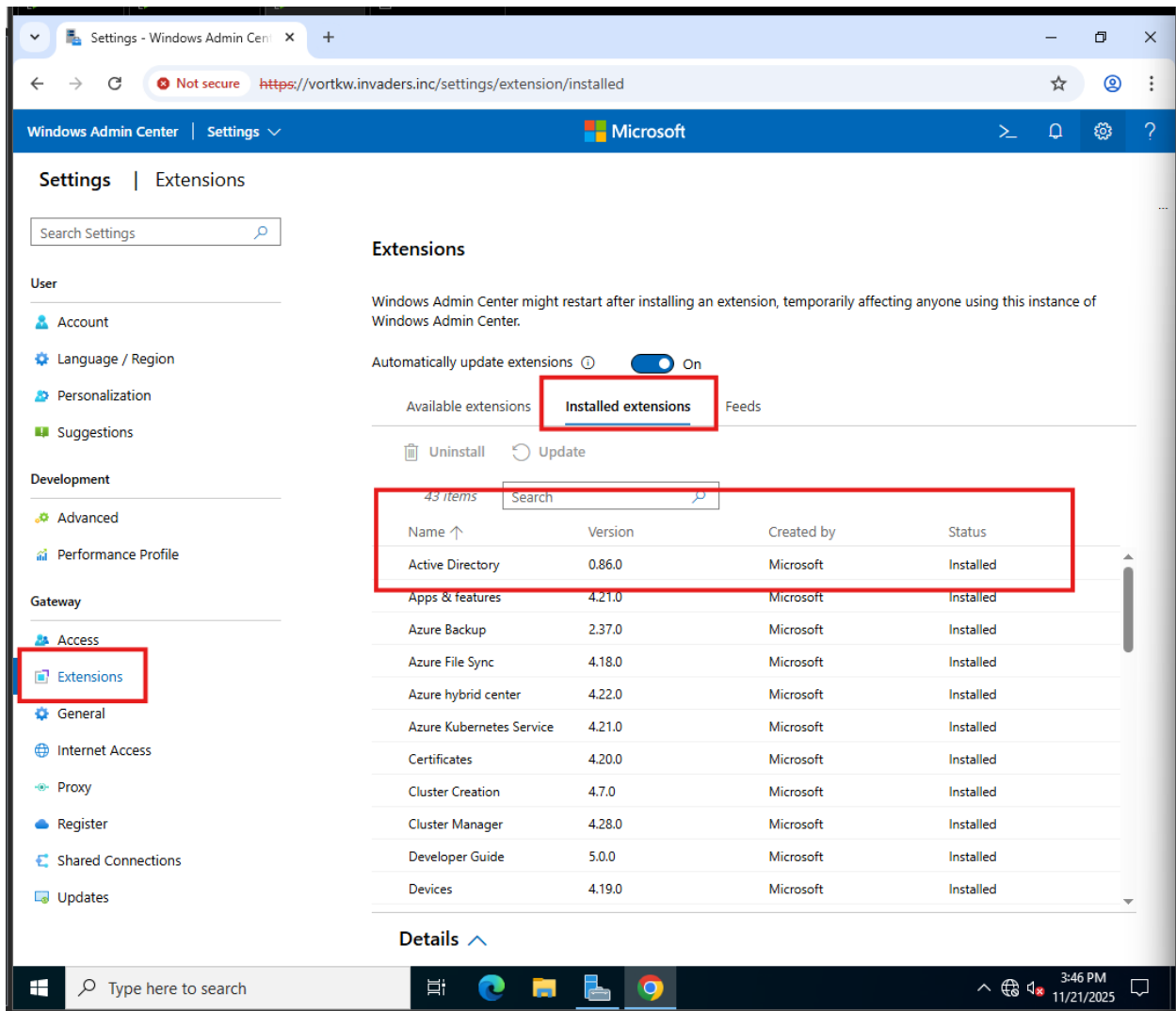


Figure 108 Active Directory installed on WAC

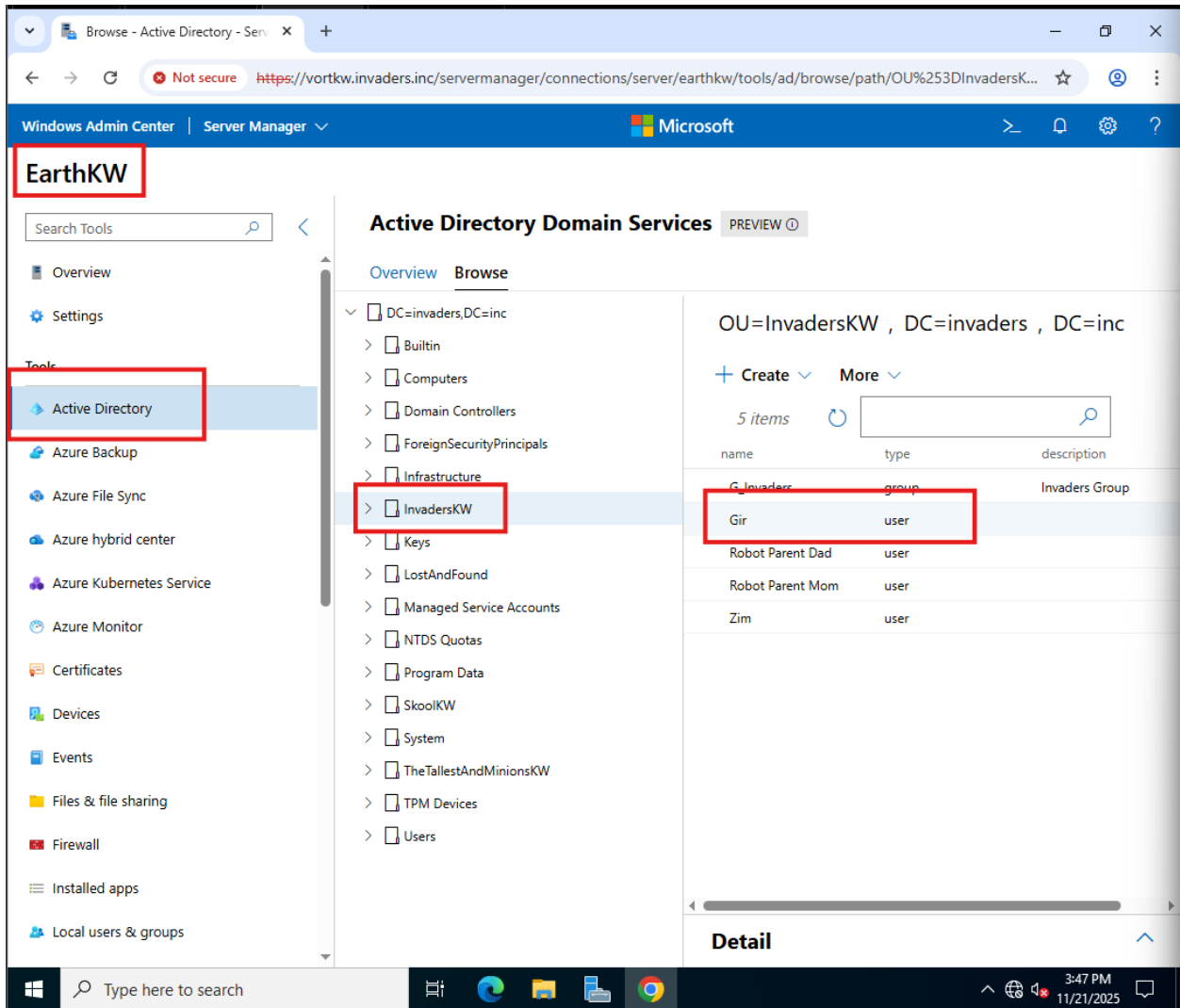


Figure 109 Proof of working Active Directory extension on WAC

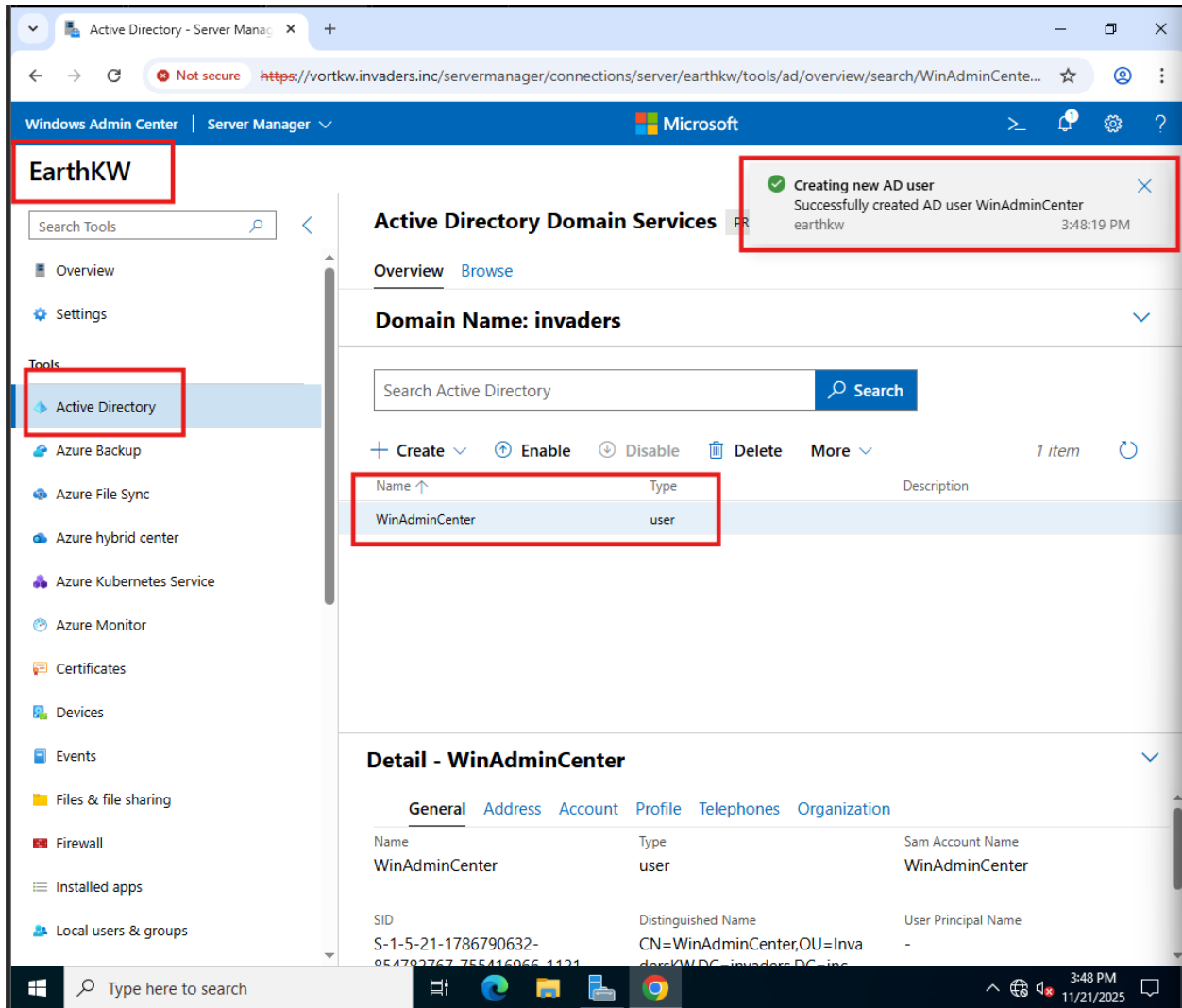


Figure 110 User created using AD extension on WAC