

Install and Configure Hyper-V



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Topics in This Module



Requirements for Hyper-V

Installing Hyper-V

Installing management tools

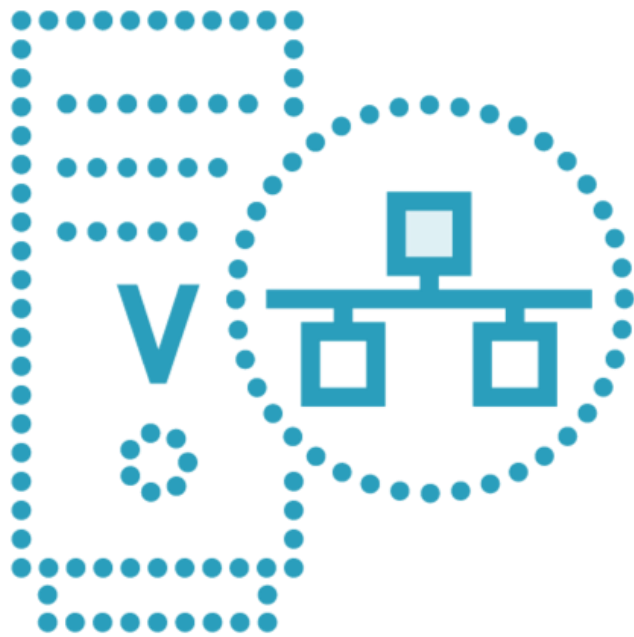
Managing Hyper-V hosts

Nested virtualization

Installing an operating system



Why Hyper-V?



Cost savings over physical machines

Virtual Desktop Infrastructure

Migrating to Azure

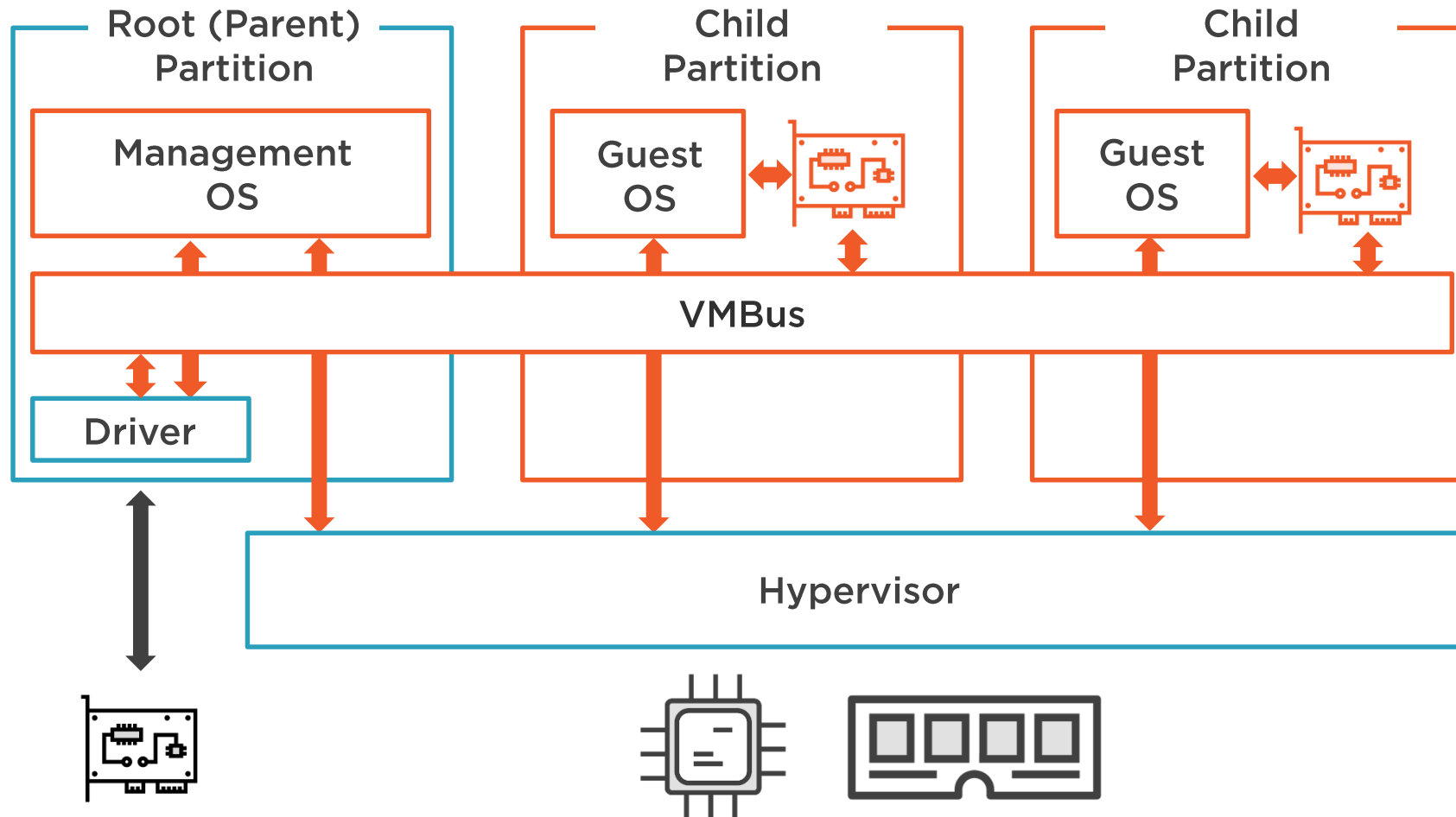
Fine-tune specific workloads

Dev and test environments

Training and education




Hyper-V Overview



Requirements for Hyper-V



A close-up photograph of a person's hand holding a black and silver ballpoint pen, writing on a piece of white graph paper. The paper has three items checked off with a checkmark: '64-bit CPU', 'Second-Level Address Translation', and 'Hardware-Assisted Virtualization'. The lighting is warm, coming from the top right.

✓ 64-bit CPU
✓ Second-Level Address Translation
✓ Hardware-Assisted Virtualization

Hyper-V host minimum requirements:

64-bit CPU

Second-Level Address Translation

Hardware-Assisted Virtualization

Data Execution Prevention

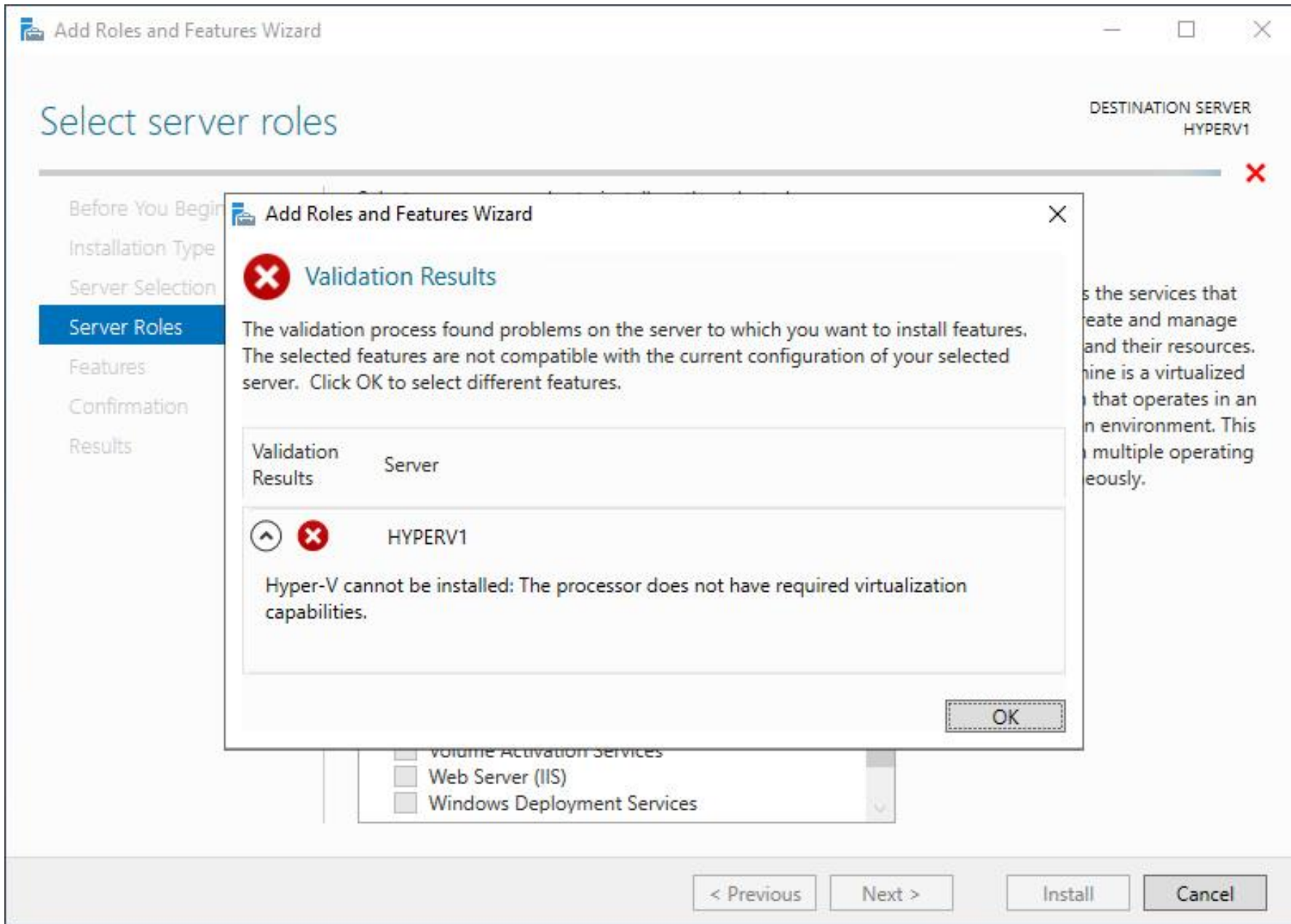
VM Monitor Mode extensions

Enough RAM!

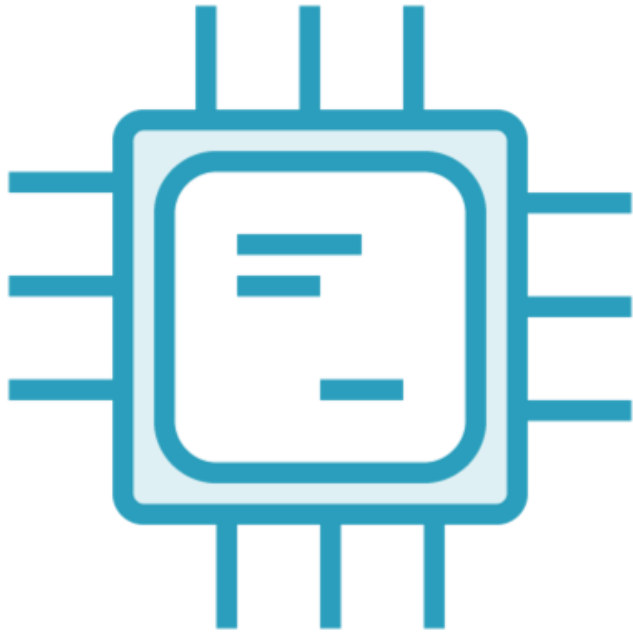


You don't need this laundry list of features if all you need to do is run the *management* tools.





64-bit CPU



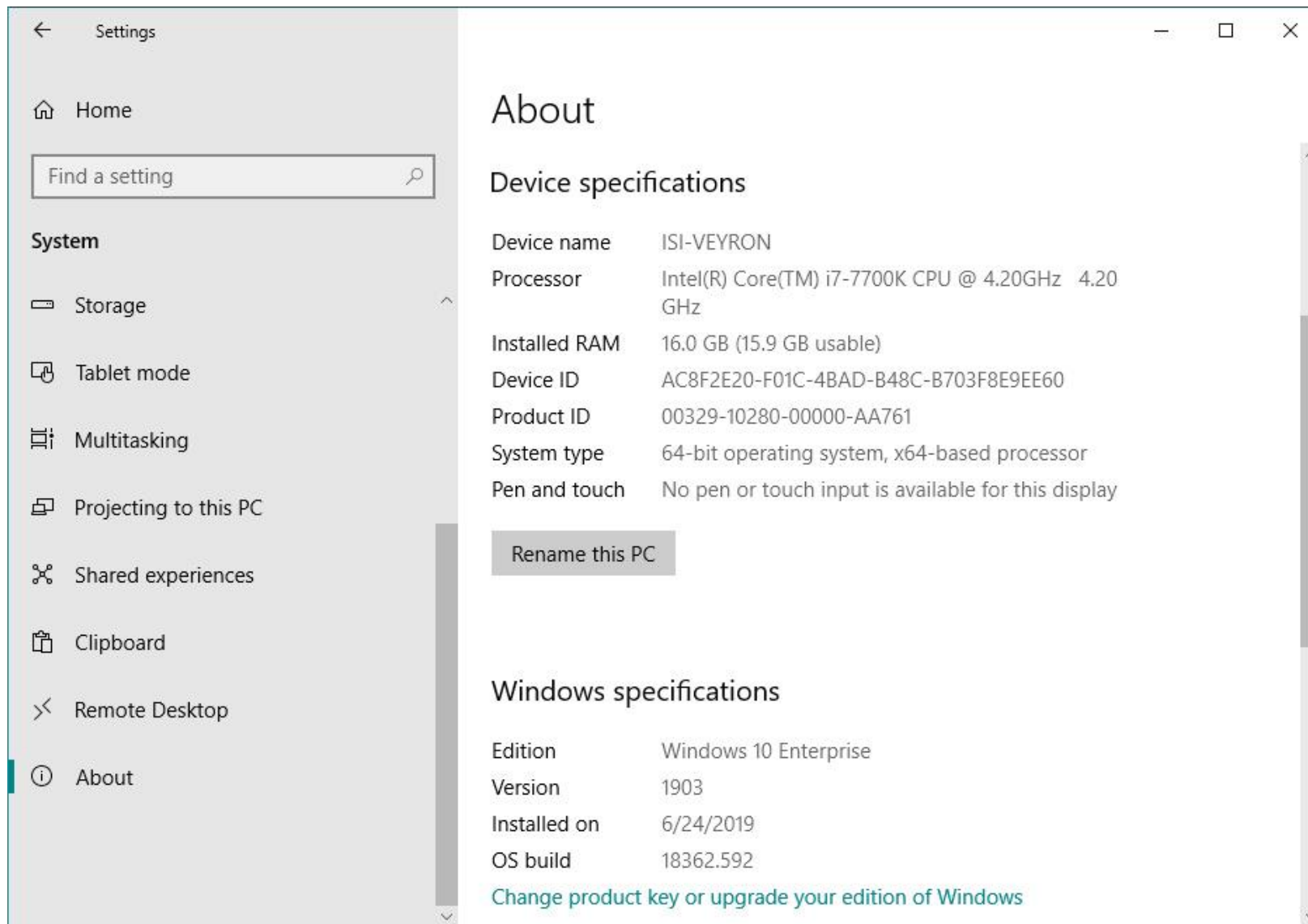
Not a problem if you're running Server 2019... it only comes as 64-bit

Windows 10 however comes in both 64-bit and 32-bit versions

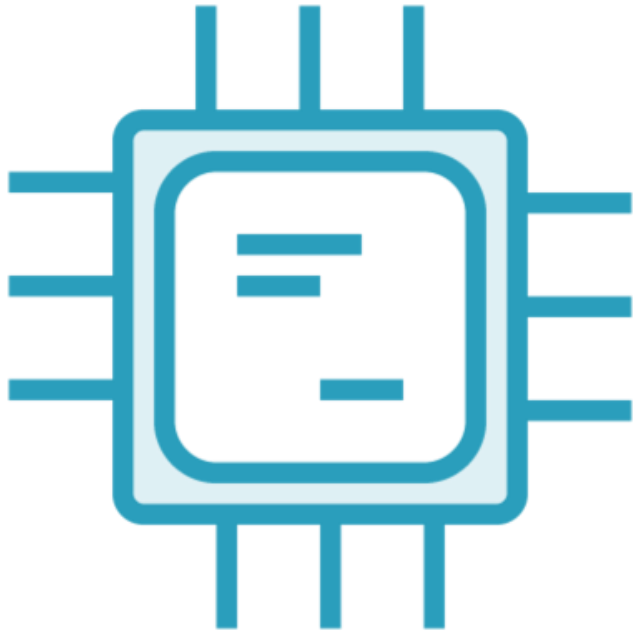
- Settings > System > About > System Type



Determining “Bitness” of Windows 10



Second Level Address Translation (SLAT)



Feature of the CPU; common in modern enterprise hardware

Virtual-to-physical memory address translation introduces overhead

With VMs, that translation occurs both in the guest and in the host

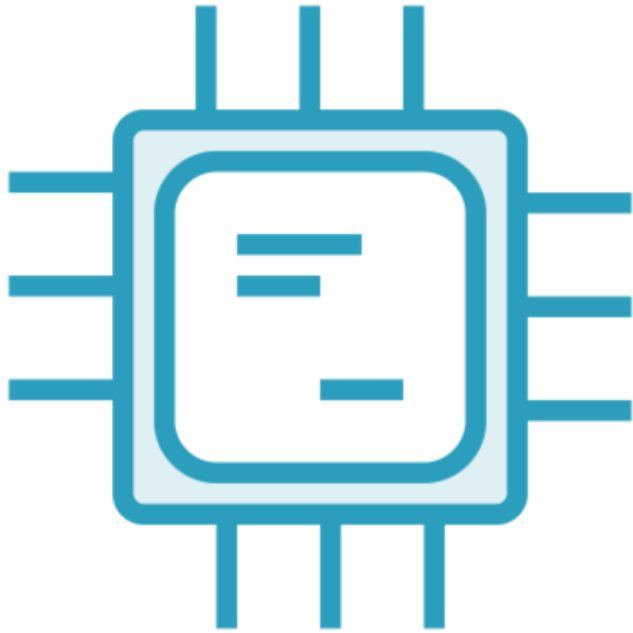
SLAT improves translation efficiency

Other names:

- AMD RVI (Rapid Virtualization Indexing)
- Intel EPT (Extended Page Table)



Hardware-Assisted Virtualization (HAV)



Feature of the CPU; common nowadays

Provides hardware “assist” to virtualization

- Better responsiveness, lower CPU use, faster I/O for VMs

Enable in BIOS or UEFI

- “Processor” or “Chipset” menu, usually

Other names:

- AMD-V
- Intel VT-x



Data Execution Prevention (DEP)



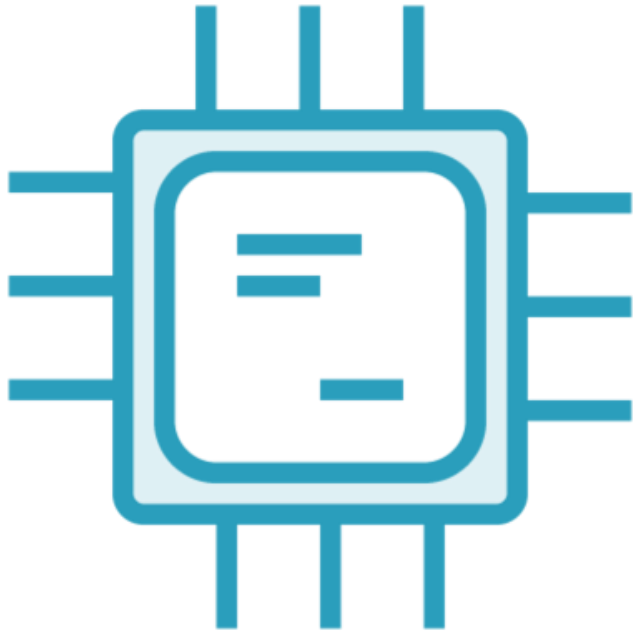
Feature of the CPU and operating system

- Also known as “NX” (No eXecute) or “XD” (eXecute Disable)
- Enable in BIOS or UEFI

Prevents code executing from memory pages that should only contain data

- Improve security, reduce likelihood of buffer-overflow exploits
- May introduce compatibility issues with some apps (create exception list)

VM Monitor Mode Extensions



Feature of the CPU

- Also known as “Intel VT-c”

Improves network I/O

- Virtual machine device queues (sorts per-VM traffic on the NIC)
- SR-IOV (directly maps virtual network ports to physical ports) (a “pass-through” technology)

Enough RAM



Total depends on:

- Number of guests
- Guest OS's and applications
- Desired performance levels
- Whether dynamic memory is used

4GB is an oft-quoted starting point

- (but almost certainly too little for most real-world scenarios)



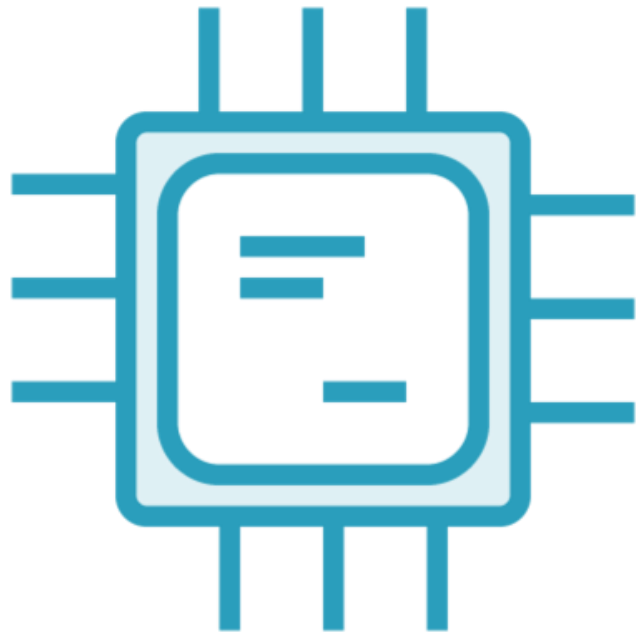


For specific features

Hyper-V in Server 2019 offers some advanced features that require additional capabilities on the host.



Requirements for “DDA”



Discrete Device Assignment

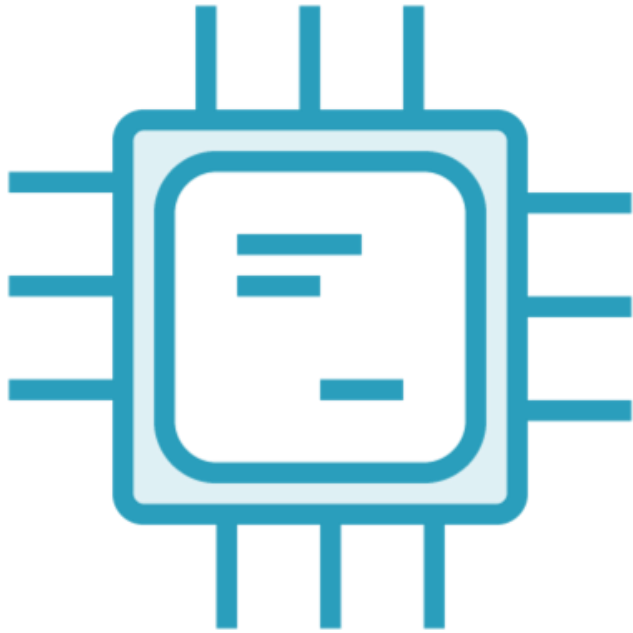
- A pass-through technology that goes beyond disk and network devices
- Improves speed of supported PCI-E devices by bypassing virtualization layer

Intel VT-d or AMD-IOMMU

- Must be present and enabled in firmware
- Handles interrupt remapping

Supported device (e.g. GPU, NVMe)

Requirements for Shielded VMs using TPM



Shielded virtual machines

- Protect VMs from a compromised host
- Encrypts VMs with BitLocker
- Keys protected by Host Guardian Service

UEFI 2.3.1c +

TPM 2.0 +

Intel VT-d IOMMU

Evaluating Host Systems



Most tools fail if Hyper-V already installed

SYSTEMINFO.EXE (command line)

MSINFO32.EXE (GUI)

COREINFO -V (command line, SysInternals)

BIOS/UEFI setup

Specification PDFs for host computers



System Information

File Edit View Help

System Summary

- Hardware Resources
- Components
- Software Environment

Item	Value
Boot Device	\Device\HarddiskVolume2
Locale	United States
Hardware Abstraction Layer	Version = "10.0.17763.831"
User Name	Not Available
Time Zone	Mountain Standard Time
Installed Physical Memory (RAM)	64.0 GB
Total Physical Memory	63.8 GB
Available Physical Memory	60.5 GB
Total Virtual Memory	73.3 GB
Available Virtual Memory	70.3 GB
Page File Space	9.50 GB
Page File	C:\pagefile.sys
Kernel DMA Protection	On
Virtualization-based security	Not enabled
Device Encryption Support	Not Available
Hyper-V - VM Monitor Mode Extensions	Yes
Hyper-V - Second Level Address Translation Extensions	Yes
Hyper-V - Virtualization Enabled in Firmware	Yes
Hyper-V - Data Execution Protection	Yes

Find what:

☐ Search selected category only ☐ Search category names only

Find Close Find



```
Administrator: Command Prompt
Microsoft Windows [Version 10.0.17763.973]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\Windows\system32>systeminfo

Host Name:                ISI-S2019
OS Name:                   Microsoft Windows Server 2019 Datacenter
OS Version:               10.0.17763 N/A Build 17763
OS Manufacturer:         Microsoft Corporation
OS Configuration:        Member Server
OS Build Type:             Multiprocessor Free
Registered Owner:         Windows User
Registered Organization:
Product ID:                *****-786886-111886-66679
Original Install Date:     1/21/2020, 11:53:10 PM
System Boot Time:          1/22/2020, 9:46:02 AM
System Manufacturer:       Intel(R) Client Systems
System Model:              NUC10i7FNH
System Type:               x64-based PC
Processor(s):              1 Processor(s) Installed.
                           [01]: Intel64 Family 6 Model 166 Stepping 0 GenuineIntel ~1105 Mhz
BIOS Version:              Intel Corp. FNCML357.0037.2019.1226.1738, 12/26/2019
Windows Directory:         C:\Windows
System Directory:          C:\Windows\system32
Boot Device:               \Device\HarddiskVolume2
System Locale:              en-us;English (United States)
Input Locale:              en-us;English (United States)
Time Zone:                 (UTC-07:00) Mountain Time (US & Canada)
Total Physical Memory:     65,341 MB
Available Physical Memory: 61,979 MB
Virtual Memory: Max Size:  75,069 MB
Virtual Memory: Available: 72,002 MB
Virtual Memory: In Use:    3,067 MB
Page File Location(s):     C:\pagefile.sys
```




```
Administrator: Command Prompt
BIOS Version: Intel Corp. FNCML357.0037.2019.1226.1738, 12/26/2019
Windows Directory: C:\Windows
System Directory: C:\Windows\system32
Boot Device: \Device\HarddiskVolume2
System Locale: en-us;English (United States)
Input Locale: en-us;English (United States)
Time Zone: (UTC-07:00) Mountain Time (US & Canada)
Total Physical Memory: 65,341 MB
Available Physical Memory: 61,979 MB
Virtual Memory: Max Size: 75,069 MB
Virtual Memory: Available: 72,002 MB
Virtual Memory: In Use: 3,067 MB
Page File Location(s): C:\pagefile.sys
Domain: corphq.i-sw.com
Logon Server: \\ISI-SRV03
Hotfix(s): 5 Hotfix(s) Installed.
           [01]: KB4532947
           [02]: KB4462930
           [03]: KB4516115
           [04]: KB4523204
           [05]: KB4534273
Network Card(s): 1 NIC(s) Installed.
                  [01]: Intel(R) Ethernet Connection (9) I219-LM
                        Connection Name: Ethernet
                        DHCP Enabled: No
                        IP address(es)
                        [01]: 10.10.1.3
Hyper-V Requirements: VM Monitor Mode Extensions: Yes
                      Virtualization Enabled In Firmware: Yes
                      Second Level Address Translation: Yes
                      Data Execution Prevention Available: Yes
C:\Windows\system32>
```



Installing Hyper-V





Installation methods by platform:

Server only

Server and Windows 10

Windows 10 only



Hyper-V Installation: Best Practices



Don't install other roles on a Hyper-V host except maybe Remote Desktop Services

A Hyper-V host should not be a DC...

...but should be *domain-joined*

- Easier security, including auditing
- Required for Hyper-V clustering

Server Core could be a good idea

- Reduced overhead, better security

Exclude Hyper-V files from antivirus scans



What About Nano Server?

Server 2019 does not permit Nano Server to be either a Hyper-V host or a Hyper-V guest. It cannot be installed onto a physical computer and is strictly for **containers** now.



Server-only Methods



PowerShell

- Install-WindowsFeature cmdlet from Server Manager module
- Run elevated
- Can run locally or remotely



`Install-WindowsFeature`

`-Name Hyper-V`

`-IncludeManagementTools`

`-Restart`

`-ComputerName <name or list>`

`-WhatIf`

- ◀ Cmdlet from Server Manager module
- ◀ Required (name of feature to install)
- ◀ Optional, don't use if managing remotely
- ◀ Optional (this role does require restart)
- ◀ Optional (assumes local computer if not specified)
- ◀ Optional (provides more detail on what gets installed)



`Install-WindowsFeature`

`-Name Hyper-V, RSAT-Hyper-V-Tools`

`-Restart`

`-ComputerName <name or list>`

`-WhatIf`

◀ Same cmdlet

◀ Another way to install management tools



Server and Windows 10 Methods



PowerShell

- Enable-WindowsOptionalFeature cmdlet from DISM module
- Run elevated

DISM

- Run elevated

Server Manager

- Add Roles and Features wizard

Windows Admin Center

`Enable-WindowsOptionalFeature`

`-FeatureName Microsoft-Hyper-V`

`-Online`

- ◀ Cmdlet from DISM module
(now present on both server and client OS)
- ◀ Hypervisor and services
(“HypervisorPlatform” for Docker;
“VirtualMachinePlatform” for Linux)
- ◀ = onto the local computer
(that is, not onto an image)

NOTE: No native provision for running against remote computers, BUT can be done remotely in a PS remoting session or via “Invoke-Command”.



DISM

/Enable-Feature

/FeatureName:Microsoft-Hyper-V

/Online

- ◀ Deployment Image Servicing and Management (dism.exe)
- ◀ Hypervisor and services (“HypervisorPlatform” for Docker; “VirtualMachinePlatform” for Linux)
- ◀ = onto the local computer (that is, not onto an image)

NOTE: On Windows 10, other feature names are available:

Microsoft-Hyper-V-All (includes tools)
Microsoft-Hyper-V-Hypervisor
Microsoft-Hyper-V-Services



Server Manager

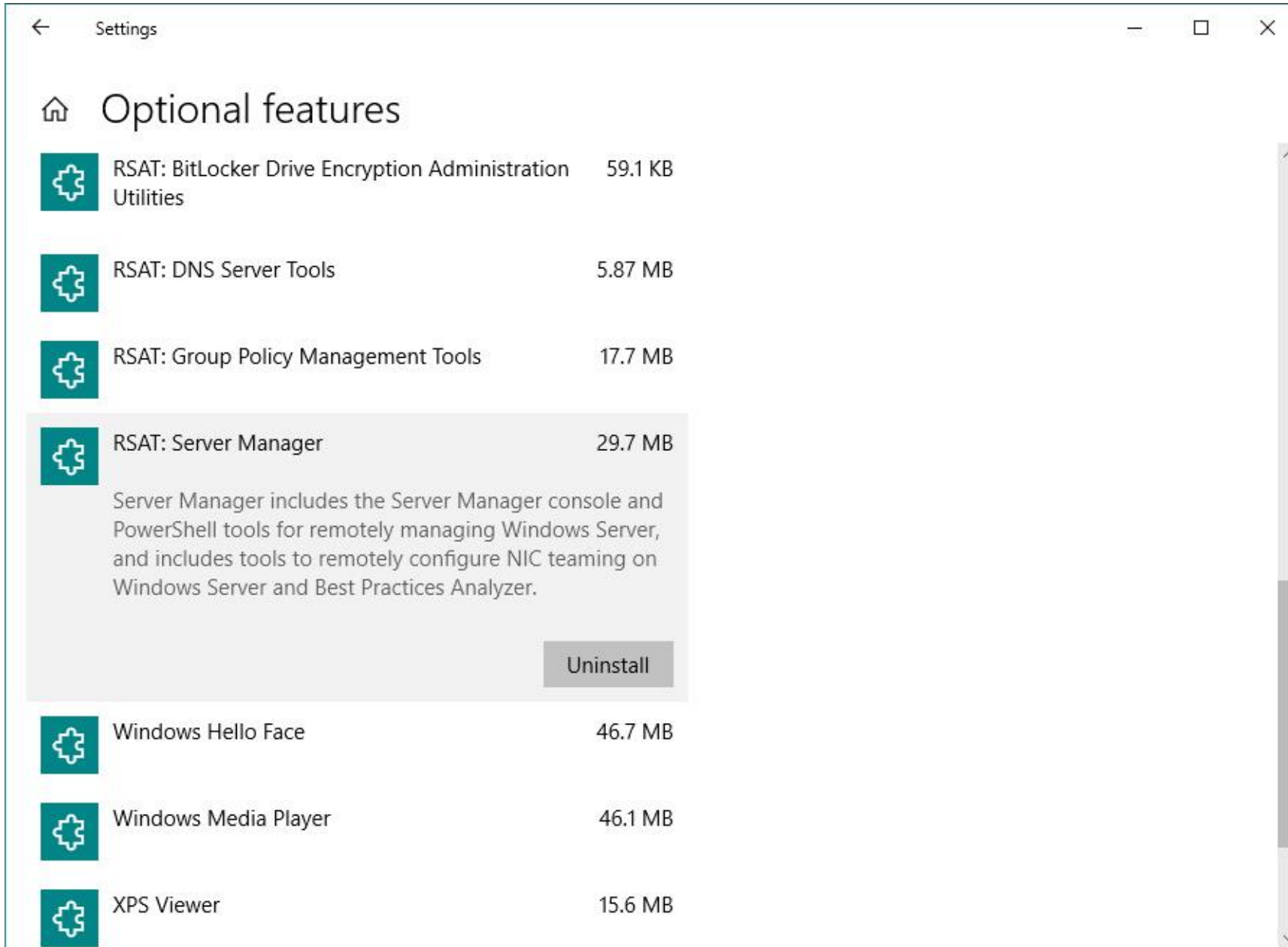


Natively present on Server OS with Desktop Experience

Can be added to Windows 10

- Settings > Apps > Optional features > RSAT: Server Manager





Demo



Installing Hyper-V with Server Manager



Windows Admin Center





Browser-based management tool

Manages servers, clusters, and clients

- Agentless
- Uses PowerShell, WMI, WinRM
- Hyper-V: install, configure, monitor
- On-premises or Azure
- Access devices directly or via gateway
- Use RSAT for AD, DNS, DHCP, IIS, etc.

Only UI for some new Server 2019 features



Configure Gateway Endpoint	Configure Gateway Endpoint
<div>Install Windows Admin Center on Windows 10</div> <div><p>This enables you to manage computers directly from a browser.</p></div> <div><p>Or you can install on Windows Server to:</p></div> <div><ul style="list-style-type: none">- Enable access for multiple admins- Connect from any PC with a supported browser- Manage computers on a private network</div> <div><p>See installation scenarios at</p></div> <div><p>https://aka.ms/WindowsAdminCenter-Install</p></div> <div><button>Back</button></div>	<div>Installing Windows Admin Center</div> <div></div> <div><p>Select a port for the Windows Admin Center site</p></div> <div><input type="text" value="6516"/></div> <div><ul style="list-style-type: none"><input checked="" type="checkbox"/> Allow Windows Admin Center to modify this machine's trusted hosts settings<input type="checkbox"/> Create a desktop shortcut to launch Windows Admin Center<input type="checkbox"/> Use WinRM over HTTPS only</div> <div><div><button>Back</button><div> Install</div><button>Cancel</button></div></div>



Demo



Installing Hyper-V with Windows Admin Center



Windows 10-only Method



**Control Panel > Programs and Features >
Turn Windows features on or off >**

Hyper-V Platform

- Hyper-V Hypervisor
- Hyper-V Services

Programs and Features

Control Panel > All Control Panel Items > Programs and Features

Search Programs and Fe...

Control Panel Home

View installed updates

Turn Windows features on or off

Install a program from the network

Uninstall or change a program

To uninstall a program, select it from the list and then click Uninstall, Change, or Repair.

Organize

Name

4K Video D

Acer Displ

Adobe Ac

Adobe Ac

Adobe AIF

Adobe Cre

Adobe Cre

Adobe Fla

Adobe Sho

Blue Jeans

BlueJeans

Camtasia

Camtasia

Canon MP

CanoScan

Corel Afte

Corel Pain

Corel Painter Thumbnail Previewer

CPUID HWMonitor 1.34

CrystalDiskInfo 8.3.2

Dell SupportAssist

Download Manager

Windows Features

Turn Windows features on or off

To turn a feature on, select its check box. To turn a feature off, clear its check box. A filled box means that only part of the feature is turned on.

☐ Guarded Host

☐ Hyper-V

- ☐ Hyper-V Management Tools
 - ☐ Hyper-V GUI Management Tools
 - ☐ Hyper-V Module for Windows PowerShell
- ☐ Hyper-V Platform
 - ☐ Hyper-V Hypervisor
 - ☐ Hyper-V Services

☒ Internet Explorer 11

☐ Internet Information Services

☐ Internet Information Services Hostable Web Core

☐ Legacy Components

OK

Cancel

Installed On

Size

Version

11/5/2018

74.6 MB

4.4.11.2412

12/14/2019

9.99 MB

3.0.2.0

2/12/2020

2.49 GB

20.006.20034

2/12/2020

351 MB

20.006.20034

6/24/2019

1.1.0.5790

2/1/2020

456 MB

5.0.0.354

6/24/2019

5.85 GB

4.0

2/11/2020

6.05 MB

32.0.0.330

8/9/2019

52.3 MB

12.3.4.204

7/5/2018

71.1 MB

1.36.9

6/24/2019

76.1 MB

2.9.252

6/24/2019

1.31 GB

18.0.5.3904

1/27/2018

401 MB

8.6.0.2079

6/24/2019

6/24/2019

7/26/2019

141 MB

3.5.0.350

7/26/2019

480 MB

6.1.0.238

6/2/2019

126 KB

18.0

1/27/2018

2.86 MB

1.34

12/8/2019

13.7 MB

8.3.2

1/18/2020

186 MB

3.4.1.49

6/9/2019

5.05 MB

1.0.3

Currently installed programs

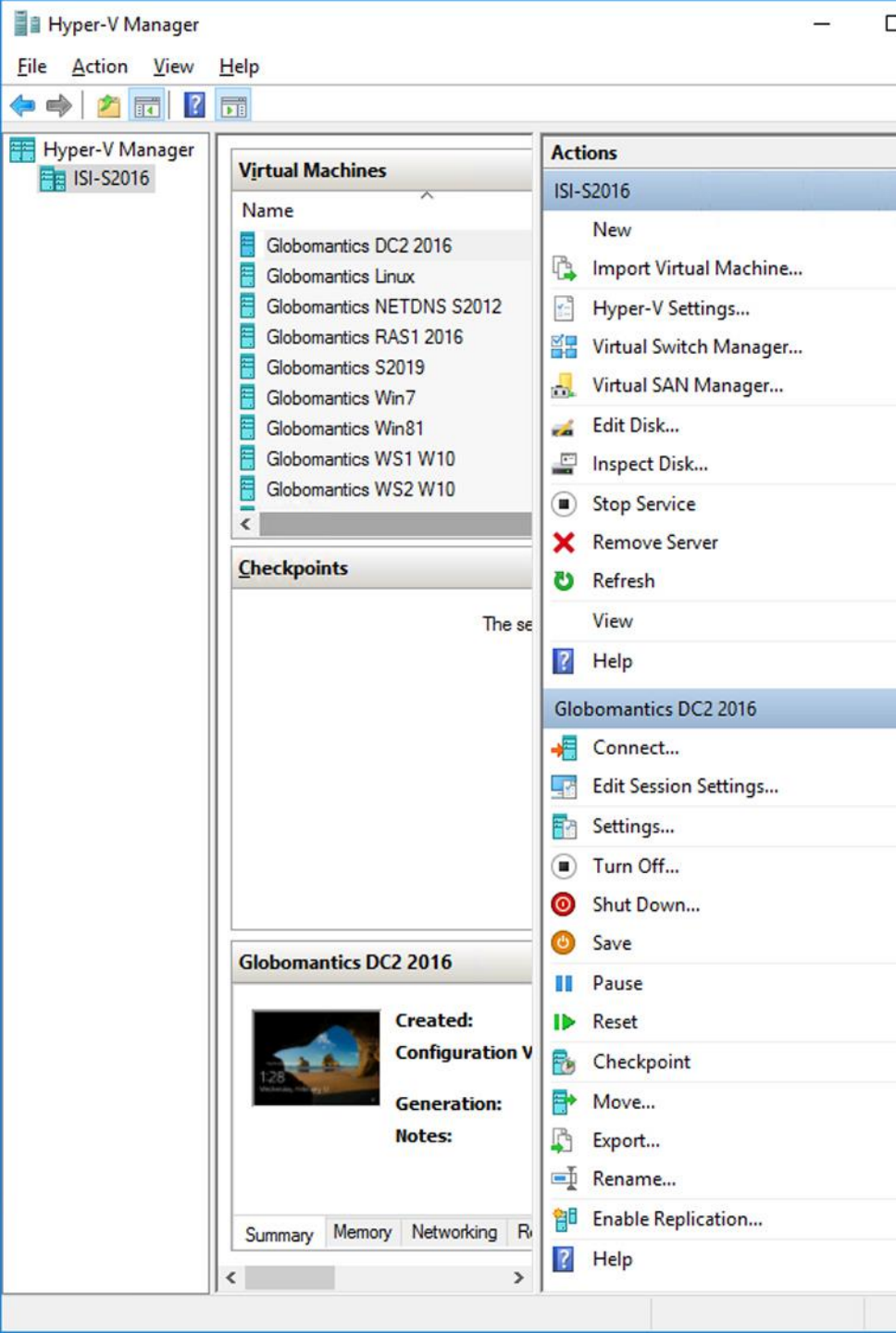
Total size: 13.6 GB

75 programs installed



Installing Management Tools





Management tools *can* co-reside with the hypervisor and services but don't *have* to

Management stations are often distinct from virtualization servers

- Particularly with Server Core
- Tools can run on Windows 10

GUI tools:

- Hyper-V Manager (virtmgmt.msc)
- Virtual Machine Connection (vmconnect.exe)

Command-line tools:

- Module for PowerShell



Server-only Methods



PowerShell

- Install-WindowsFeature cmdlet from Server Manager module
- Run elevated
- Can run locally or remotely



Install-WindowsFeature

`-Name Hyper-V-PowerShell`

`-ComputerName <name or list>`

◀ Required (name of feature to install)

“Hyper-V-Tools” = just GUI tools

“RSAT-Hyper-V-Tools” = GUI + PS

◀ Optional (assumes local computer if not specified)



Server and Windows 10 Methods



PowerShell

- Enable-WindowsOptionalFeature cmdlet from DISM module
- Run elevated

DISM

- Run elevated

Server Manager

- Add Roles and Features wizard

Windows Admin Center

Enable-WindowsOptionalFeature

-FeatureName Microsoft-Hyper-V-
Management-Clients -All

-Online

- ◀ Cmdlet from DISM module
(now present on both server and client OS)
- ◀ GUI tools only
 - “Microsoft-Hyper-V-Management-PowerShell” for PS tools only
 - “RSAT-Hyper-V-Tools-Feature” for GUI *and* PS tools (server only)
 - “Microsoft-Hyper-V-Tools-All” (Win10 only)
- ◀ = onto the local computer
(that is, not onto an image)

NOTE: No native provision for running against remote computers, BUT can be done remotely in a PS remoting session or via “Invoke-Command”.



DISM

/Enable-Feature

/FeatureName:Microsoft-Hyper-V-
Management-Clients

/Online

- ◀ Deployment Image Servicing and Management (dism.exe)
- ◀ GUI tools only
 - “Microsoft-Hyper-V-Management-PowerShell” for PS tools only
 - “RSAT-Hyper-V-Tools-Feature” for GUI *and* PS tools (server only)
 - “Microsoft-Hyper-V-Tools-All” (Win10 only)
- ◀ = onto the local computer (that is, not onto an image)



Select features

DESTINATION SERVER
ISI-s2019.corphq.i-sw.com

Before You Begin

Installation Type

Server Selection

Server Roles

Features

Confirmation

Results

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

Features

- ☐ Quality Windows Audio Video Experience
- ☐ RAS Connection Manager Administration Kit (CMA)
- ☐ Remote Assistance
- ☐ Remote Differential Compression
- ☒ Remote Server Administration Tools
 - ☐ Feature Administration Tools
 - ☒ Role Administration Tools
 - ☐ AD DS and AD LDS Tools
 - ☒ Hyper-V Management Tools
 - ☐ Hyper-V GUI Management Tools
 - ☐ Hyper-V Module for Windows PowerSh
 - ☐ Remote Desktop Services Tools
 - ☐ Windows Server Update Services Tools
 - ☐ Active Directory Certificate Services Tools
 - ☐ Active Directory Rights Management Servic
 - ☐ DHCP Server Tools
 - ☐ DNS Server Tools
 - ☐ Fax Server Tools
 - ☐ File Services Tools

Description

Hyper-V Management Tools includes GUI and command-line tools for managing Hyper-V.

< Previous

Next >

Install

Cancel



Roles & features - Serve

https://localhost:6516/servermanager/connections/server/isi-s2019.corphq.i-sw.com/tools/rolesfeatures

Windows Admin CenterServer ManagerMicrosoft

isi-s2019.corphq.i-sw.com

Tools

Search Tools

Devices

Events

Files

Firewall

Installed apps

Local users & groups

Networks

Performance Monitor

PowerShell

Processes

Registry

Remote Desktop

Roles & features

Scheduled tasks

Settings

Roles and features

+ Install

— Uninstall

270 items

Name	State	Type
Remote Server Administration Tools	0 of 44 Installed	Feature
Feature Administration Tools	0 of 17 Installed	Feature
Role Administration Tools	0 of 27 Installed	Feature
Active Directory Certificate Services Tools	0 of 2 Installed	Feature
Active Directory Rights Management Services Tools	Available	Feature
AD DS and AD LDS Tools	0 of 4 Installed	Feature
DHCP Server Tools	Available	Feature
DNS Server Tools	Available	Feature
Fax Server Tools	Available	Feature
File Services Tools	0 of 3 Installed	Feature
Hyper-V Management Tools	0 of 2 Installed	Feature
Hyper-V GUI Management Tools	Available	Feature
Hyper-V Module for Windows PowerShell	Available	Feature
Network Controller Management Tools	Available	Feature
Network Policy and Access Services Tools	Available	Feature
Print and Document Services Tools	Available	Feature
Remote Access Management Tools	0 of 2 Installed	Feature

Details

Programs and Features

Control Panel Home

Uninstall or change a program

To uninstall a program, select it from the list and then click Uninstall, Change, or Repair.

View installed updates

Turn Windows features on or off

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Organize

Name

Windows Features

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- ☐ Guarded Host
- ☐ Hyper-V
 - ☐ Hyper-V Management Tools
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 - ☐ Hyper-V Module for Windows PowerShell
 - ☐ Hyper-V Platform
 - ☐ Hyper-V Hypervisor
 - ☐ Hyper-V Services
- ☒ Internet Explorer 11
- ☐ Internet Information Services
- ☐ Internet Information Services Hostable Web Core
- ☐ Legacy Components

OK Cancel

Installed On	Size	Version
11/5/2018	74.6 MB	4.4.11.2412
12/14/2019	9.99 MB	3.0.2.0
2/12/2020	2.49 GB	20.006.20034
2/12/2020	351 MB	20.006.20034
6/24/2019		1.1.0.5790
2/1/2020	456 MB	5.0.0.354
6/24/2019	5.85 GB	4.0
2/11/2020	6.05 MB	32.0.0.330
8/9/2019	52.3 MB	12.3.4.204
7/5/2018	71.1 MB	1.36.9
6/24/2019	76.1 MB	2.9.252
6/24/2019	1.31 GB	18.0.5.3904
1/27/2018	401 MB	8.6.0.2079
6/24/2019		
6/24/2019		
7/26/2019	141 MB	3.5.0.350
7/26/2019	480 MB	6.1.0.238
6/2/2019	126 KB	18.0
1/27/2018	2.86 MB	1.34
12/8/2019	13.7 MB	8.3.2
1/18/2020	186 MB	3.4.1.49
6/9/2019	5.05 MB	1.0.3

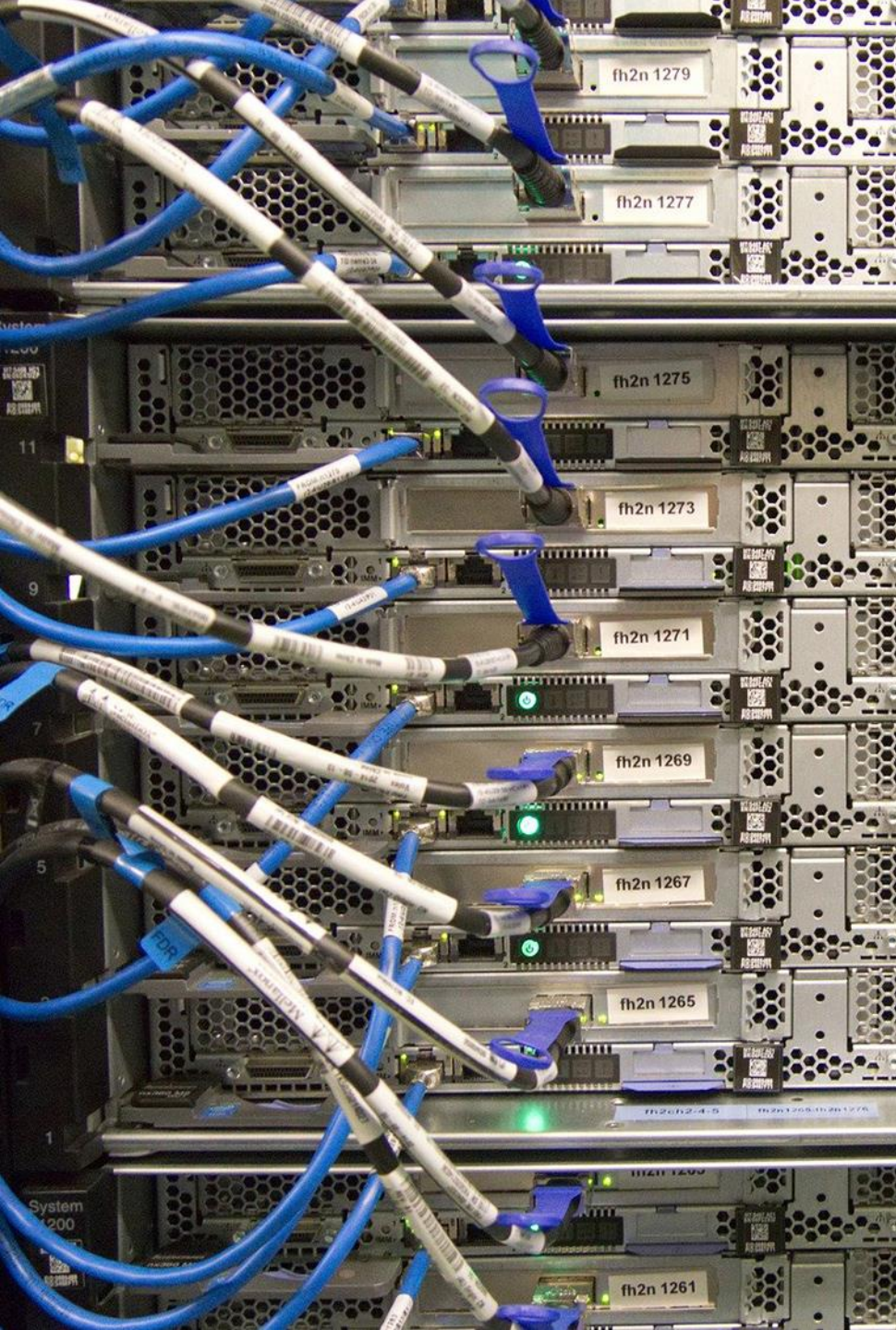
Currently installed programs Total size: 13.6 GB

75 programs installed



Managing Hyper-V Hosts





Managing Hyper-V hosts:

Remote management

- GUI tools
- PowerShell and PowerShell Direct

Delegating management



Before you can run management tools against a Hyper-V host, you must **enable** that host for remote management.



Administrator: C:\Windows\system32\cmd.exe - sconfig.cmd

Microsoft (R) Windows Script Host Version 5.812
Copyright (C) Microsoft Corporation. All rights reserved.

Inspecting system...

=====

Server Configuration

=====

- | | |
|---------------------------------|------------------------------------|
| 1) Domain/Workgroup: | Domain: company.pri |
| 2) Computer Name: | HYPERV1 |
| 3) Add Local Administrator | |
| 4) Configure Remote Management | Enabled |
| 5) Windows Update Settings: | DownloadOnly |
| 6) Download and Install Updates | |
| 7) Remote Desktop: | Enabled (more secure clients only) |
| 8) Network Settings | |
| 9) Date and Time | |
| 10) Telemetry settings | Unknown |
| 11) Windows Activation | |
| 12) Log Off User | |
| 13) Restart Server | |
| 14) Shut Down Server | |
| 15) Exit to Command Line | |

Enter number to select an option:



Dashboard

Local Server

All Servers

AD DS

DNS

File and Storage Services ▸

PROPERTIES

For DC

TASKS ▾

Computer name	DC	Last installed updates	2/22/2020 8:30 AM
Domain	company.pri	Windows Update	Download updates
		Last checked for updates	2/22/2020 8:30 AM
Windows Defender Firewall	Public: On	Windows Defender Antivirus	Real-Time Protection
Remote management	Enabled	Feedback & Diagnostics	Settings
Remote Desktop	Enabled	IE Enhanced Security Configuration	On
NIC Teaming	Disabled	Time zone	(UTC-07:00) Mountain Standard Time
Ethernet	192.168.3.10	Product ID	00430-70396-00000-00000-AA
Operating system version	Microsoft Windows Server 2019 Datacenter	Processors	Intel(R) Core(TM) i7-8665U CPU @ 2.80GHz
Hardware information	Microsoft Corporation Virtual Machine	Installed memory (RAM)	1 GB
		Total disk space	126.4 GB

EVENTS

All events | 0 total

TASKS ▾

Filter



Server Name

ID

Severity

Source

Log

Date and Time

Remote Management: GUI Tools



Server Manager

- Various functions and tools

Hyper-V Manager

- Traditional, specialized MMC console
- Dense layout with context menus

Windows Admin Center

- New, PowerShell-based console
- Sparse layout with no context menus
- Latency can be an issue
- Aspires to be “single pane of glass”



Add a feature



RSAT: Network Controller Management Tools

163 KB



RSAT: Network Load Balancing Tools

267 KB



RSAT: Remote Access Management Tools

6.70 MB



RSAT: Remote Desktop Services Tools

947 KB



RSAT: Server Manager

6.35 MB



RSAT: Shielded VM Tools

17.3 MB



RSAT: Storage Migration Service Management Tools

116 KB



RSAT: Storage Replica Module for Windows PowerShell

450 KB



RSAT: System Insights Module for Windows PowerShell

55.1 KB





Dashboard

All Servers

File and Storage Services ▸

Hyper-V

SERVERS

All servers | 1 total

TASKS ▾

Filter



Server Name	IPv4 Address	Manageability	Last Update	Windows Activation
HYPERV1	192.168.3.200	Online - Performance counters not started	2/24/2020 12:08:55 PM	00430-70396-31180-AA124 (Activated)

- Add Roles and Features
- Restart Server
- Computer Management
- Remote Desktop Connection
- Windows PowerShell
- Configure NIC Teaming
- Hyper-V Manager
- Manage As ...
- Start Performance Counters
- Remove Server
- Refresh
- Copy

EVENTS

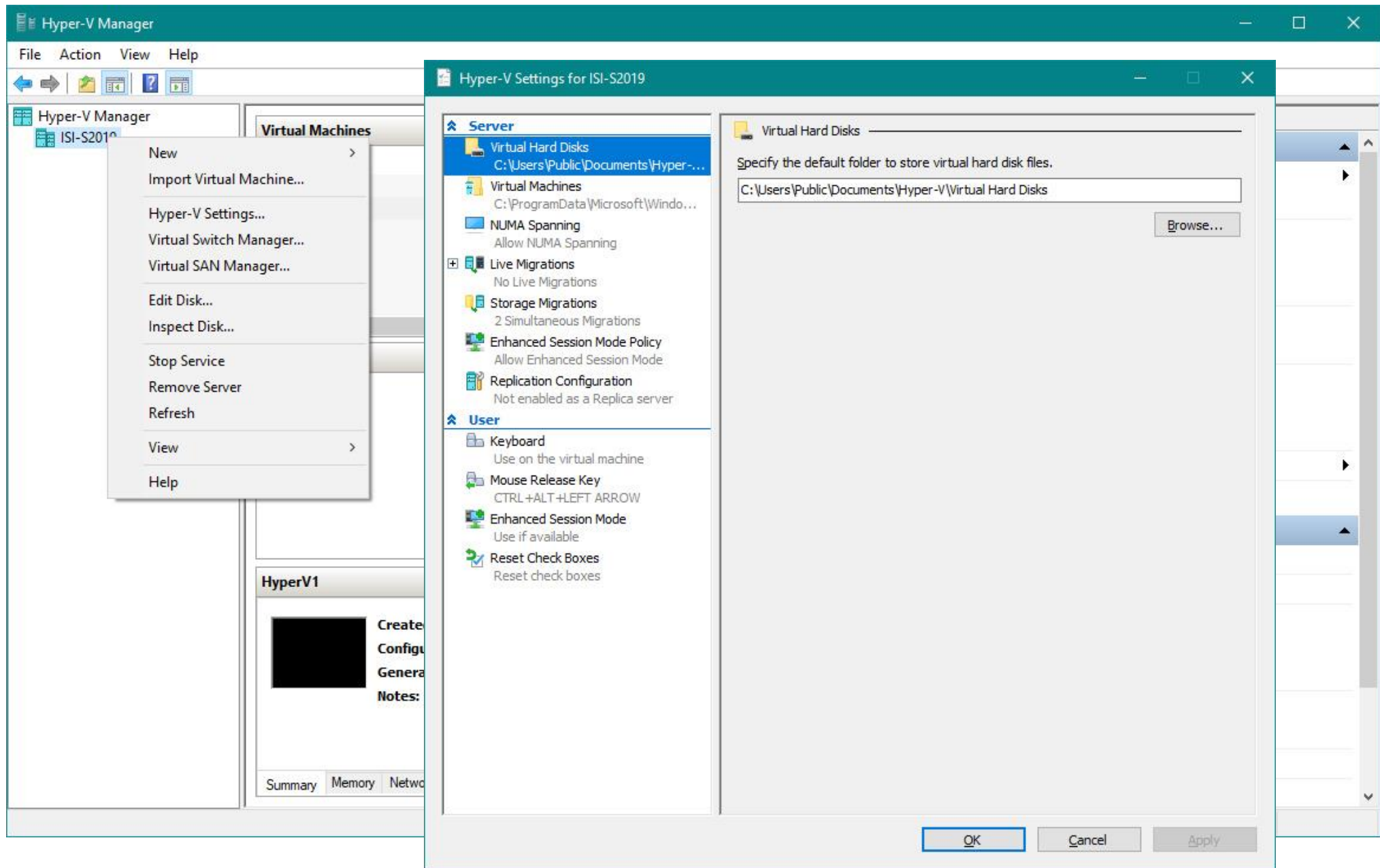
All events | 3 to

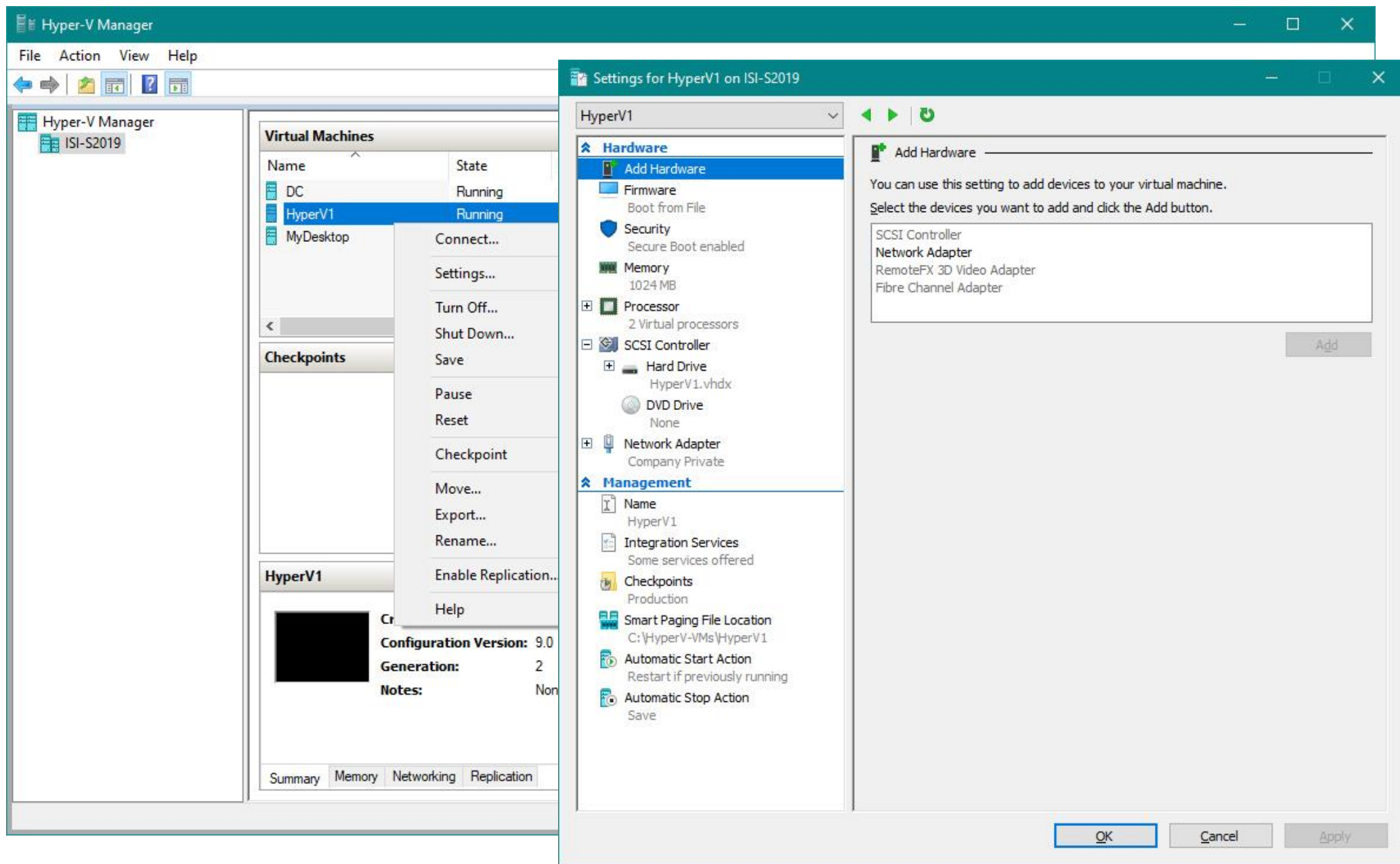
TASKS ▾

Filter

Server Name	Event ID	Category	Source	Log	Date and Time
HYPERV1	1014	Warning	Microsoft-Windows-DNS Client Events	System	2/24/2020 8:27:56 AM
HYPERV1	10154	Warning	Microsoft-Windows-Windows Remote Management	System	2/24/2020 8:26:58 AM
HYPERV1	5719	Error	NETLOGON	System	2/24/2020 8:26:58 AM







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Tools

- Events
- Files
- Firewall
- Installed apps
- Local users & groups
- Networks
- Performance Monitor
- PowerShell
- Processes
- Registry
- Remote Desktop
- Roles & features
- Scheduled tasks
- Services
- Storage
- Storage Migration Service
- Storage Replica
- System Insights
- Updates
- Virtual machines**
- Virtual switches
- Settings

Virtual machines

[Summary](#) [Inventory](#)

Status

Running	Off	Saved	Paused	Total
3	0	0	0	3

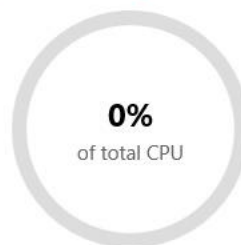
Events

- Microsoft-Windows-Hyper-V-Chipset An hour ago
'MyDesktop' successfully booted an operating system. (Virtual machine ID 729664F8-1496-4397-B989-1D316EBB3D87)
- Microsoft-Windows-Hyper-V-Worker An hour ago
'MyDesktop' started successfully. (Virtual machine ID 729664F8-1496-4397-B989-1D316EBB3D87)
- Microsoft-Windows-Hyper-V-SynthStor An hour ago
'MyDesktop': (B7F7C3F2-67CE-4D3D-9E22-AE2025F16CA4) started successfully. (Virtual machine ID 729664F8-1496-4397-B989-1D316EBB3D87)
- Microsoft-Windows-Hyper-V-SynthNic An hour ago
'MyDesktop' Network Adapter (2BE0E5E6-2A06-4666-B9F8-288DE37BB99F) started successfully. (Virtual Machine ID 729664F8-1496-4397-B989-1D316EBB3D87)
- Microsoft-Windows-Hyper-V-SynthNic An hour ago
'MyDesktop' Network Adapter (729664F8-1496-4397-B989-1D316EBB3D87--2BE0E5E6-2A06-4666-B9F8-288DE37BB99F) Connected to virtual network. (Virtual Machine ID 729664F8-1496-4397-B989-1D316EBB3D87)

[View all events >](#)

CPU

Host	Guest
0%	0%



Top CPU usage

Name	CPU usage
MyDesktop	0 %
HyperV1	0 %
DC	0 %

Memory

Host	Guest
6.5%	5.6%



Top assigned memory

Name	Assigned memory ↓
MyDe...	2.5 %
DC	1.6 %
Hyper...	1.6 %

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Tools

Search Tools 🔍

- Services
- Events
- Files
- Firewall
- Installed apps
- Local users & groups
- Networks
- Performance Monitor
- PowerShell
- Processes
- Registry
- Remote Desktop
- Roles & features
- Scheduled tasks
- Services
- Storage
- Storage Migration Service
- Storage Replica
- System Insights
- Updates
- Virtual machines**
- Virtual switches
- Settings

Virtual machines

Summary **Inventory**

+ New < Connect ⚙️ Settings More ▾ 3 items 🔁 🔍 Search 🔍										
<input type="checkbox"/>	Name ↑	St...	CPU usa...	Memory press...	Memory dem...	Assigned mem...	Upti...	Heartb...	Disaster Recovery sta...	Ta...
	DC	Ru...	0 %	98 %	1003 MB	1 GB	0:11:5...	OK	Not signed in	
	HyperV1	Ru...	0 %	0 %	0 B	1 GB	0:02:3...	OK	Not signed in	
	MyDesktop	Ru...	0 %	84 %	1.32 GB	1.58 GB	0:01:3...	OK	Not signed in	



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Tools

- Events
- Files
- Firewall
- Installed apps
- Local users & groups
- Networks
- Performance Monitor
- PowerShell
- Processes
- Registry
- Remote Desktop
- Roles & features
- Scheduled tasks
- Services
- Storage
- Storage Migration Service
- Storage Replica
- System Insights
- Updates
- Virtual machines**
- Virtual switches
- Settings

Virtual machines > DC

[Connect](#) [Settings](#) [Start](#) [Shut down](#) [Save](#) [New checkpoint](#) [More](#)

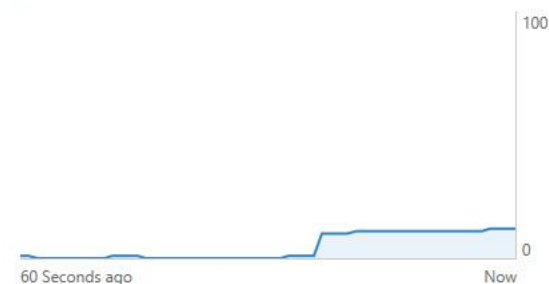
Properties

State	Host	Dynamic memory
Running	ISI-S2019	Disabled
Last replication	Last successful checkpoint	Uptime
-	-	0:12:05:10
Generation	Memory assigned	Memory demand
2	1 GB	1.01 GB
Status	Virtual processors	Created
Operating normally	2	Feb 22, 2020, 5:04:44 PM
Operating system	Operating system version	Integration services version
Windows Server 2019 Datacenter	10.0.17763	10.0.17763
Computer name	Clustered	Disaster Recovery status
DC.company.pri	No	Sign in to Azure

Performance

CPU

12 %



Memory

1 GB



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Tools

Overview

Azure hybrid services

Azure Backup

Azure File Sync

Azure Monitor

Azure Security Center

Certificates

Devices

Events

Files

Firewall

Installed apps

Local users & groups

Networks

Performance Monitor

PowerShell

Processes

Registry

Remote Desktop

Roles & features

Scheduled tasks

Settings

Events

> HostGuardianService-Client

> HttpLog

> HttpService

> Hyper-V-Compute

> Hyper-V-Config

> Hyper-V-Guest-Drivers-Dynamic-Memory

▼ Hyper-V-Hypervisor

Microsoft-Windows-Hyper-V-Hypervisor-Admin

Microsoft-Windows-Hyper-V-Hypervisor-Analytic

Microsoft-Windows-Hyper-V-Hypervisor-Operational

> Hyper-V-Netvsc

> Hyper-V-StorageVSP

> Hyper-V-VID

▼ Hyper-V-VMMS

Microsoft-Windows-Hyper-V-VMMS-Admin

Microsoft-Windows-Hyper-V-VMMS-Analytic

Microsoft-Windows-Hyper-V-VMMS-Networking

Microsoft-Windows-Hyper-V-VMMS-Operational

Microsoft-Windows-Hyper-V-VMMS-Storage

> Hyper-V-VMSP

> Hyper-V-VmSwitch

> Hyper-V-Worker

> IdCtrls

> IE-SmartScreen

> IME-Broker

> IME-CandidateUI

> IME-CustomerFeedbackManager

> IME-CustomerFeedbackManagerUI

> IME-JPAPI

> IME-JPLMP

> IME-JPPRED

Clear Export Disable Log

12 items



Search



Level	Date and Time ↓	Source	Event ID
Information	2/22/2020, 11:02:09 PM	Microsoft-Wind...	27301
Information	2/22/2020, 11:02:08 PM	Microsoft-Wind...	27300
Information	2/22/2020, 11:01:50 PM	Microsoft-Wind...	27301
Information	2/22/2020, 11:01:49 PM	Microsoft-Wind...	27300
Information	2/22/2020, 11:01:26 PM	Microsoft-Wind...	27301
Information	2/22/2020, 11:01:25 PM	Microsoft-Wind...	27300
Information	2/22/2020, 8:26:45 PM	Microsoft-Wind...	27311
Information	2/22/2020, 8:26:44 PM	Microsoft-Wind...	27310
Information	2/22/2020, 5:04:45 PM	Microsoft-Wind...	27311
Information	2/22/2020, 5:04:44 PM	Microsoft-Wind...	27310
Information	2/22/2020, 11:51:53 AM	Microsoft-Wind...	27311
Information	2/22/2020, 11:51:52 AM	Microsoft-Wind...	27310

Event 27301, Microsoft-Windows-Hyper-V-V... ▾

Description Details

The system successfully compacted 'C:\HyperV-VMs\HyperV1\Virtual Hard Disks\HyperV1.vhdx'.



PowerShell



Many PowerShell cmdlets for managing Hyper-V hosts and guests

Verb-object format (“Get-VM”)

- Verbs like Add, Connect, Enable, Get, New, Remove, Rename, Set, Start
- Objects like VM, VMSwitch, VMNetworkAdapter, VMHost, VHD

Parameters modify cmdlet behavior

<https://docs.microsoft.com/<lang>/powershell/module/hyper-v/>

https://docs.microsoft.com/en-us/powershell/module/hyper-v/?view=win10-ps

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Edit

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Theme

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Version

Windows 10 and Windows Server 2016...

Search

> hostcomputeservice

> hyper-v

hyper-v

Add-VMdvdDrive

Add-VMFibreChannelHba

Add-VMGroupMember

Add-VMHardDiskDrive

Add-VMMigrationNetwork

Add-VMNetworkAdapter

Add-VMNetworkAdapterAd

Add-VMNetworkAdapterExtendedAd

Add-VMNetworkAdapterRoutingDomainMapping

Add-VMRemoteFx3dVideoAdapter

Add-VMScsiController

Add-VMStoragePath

Add-VMSwitch

Add-VMSwitchExtensionPortFeature

Add-VMSwitchExtensionSwitchFeature

Hyper-V

This reference provides cmdlet descriptions and syntax for all Hyper-V-specific cmdlets. It lists the cmdlets in alphabetical order based on the verb at the beginning of the cmdlet.

hyper-v

Add-VMdvdDrive	Adds a DVD drive to a virtual machine.
Add-VMFibreChannelHba	Adds a virtual Fibre Channel host bus adapter to a virtual machine.
Add-VMGroupMember	Adds group members to a virtual machine group.
Add-VMHardDiskDrive	Adds a hard disk drive to a virtual machine.
Add-VMMigrationNetwork	Adds a network for virtual machine migration on one or more virtual machine hosts.
Add-VMNetworkAdapter	Adds a virtual network adapter to a virtual machine.
Add-VMNetworkAdapterAd	Creates an ACL to apply to the traffic through a virtual machine network adapter.
Add-VMNetworkAdapterExtendedAd	Creates an extended ACL for a virtual network adapter.
Add-VMRemoteFx3dVideoAdapter	Adds a RemoteFX video adapter in a virtual machine.
Add-VMScsiController	Adds a SCSI controller in a virtual machine.
Add-VMStoragePath	Adds a path to a storage resource pool.
Add-VMSwitch	Adds a virtual switch to an Ethernet resource pool.

Is this page helpful?

Yes

No

In this article

[hyper-v](#)

PowerShell Direct



Run cmdlets in a VM from the host without setting up a network connection

- Single-use (Invoke-Command)
- Interactive session (Enter-PSSession)
- Persistent session (New-PSSession)

Use either the VM name or GUID in the cmdlet

- -VMName, -VMId

Both host and guest must be running Windows 10 or Server 2016+



You do need **guest credentials** in the VM to use PowerShell Direct.





PowerShell Direct is probably more useful when your management system resides in a different **domain**.



Demo



Using PowerShell Direct



Delegating VM Management



No perfect solution

“Hyper-V Administrators” local group

- Confers *full access* to all Hyper-V features and VMs on the host

SCVMM (\$\$)

- Per-resource assignable permissions
- Controllable access to VM Viewer

JEA (“Just Enough Administration”)

- Only for PowerShell cmdlets
- Fairly complicated



The older tool “Authorization Manager” (also known as AzMan) has been deprecated and not replaced.

:(



Delegating VM Management

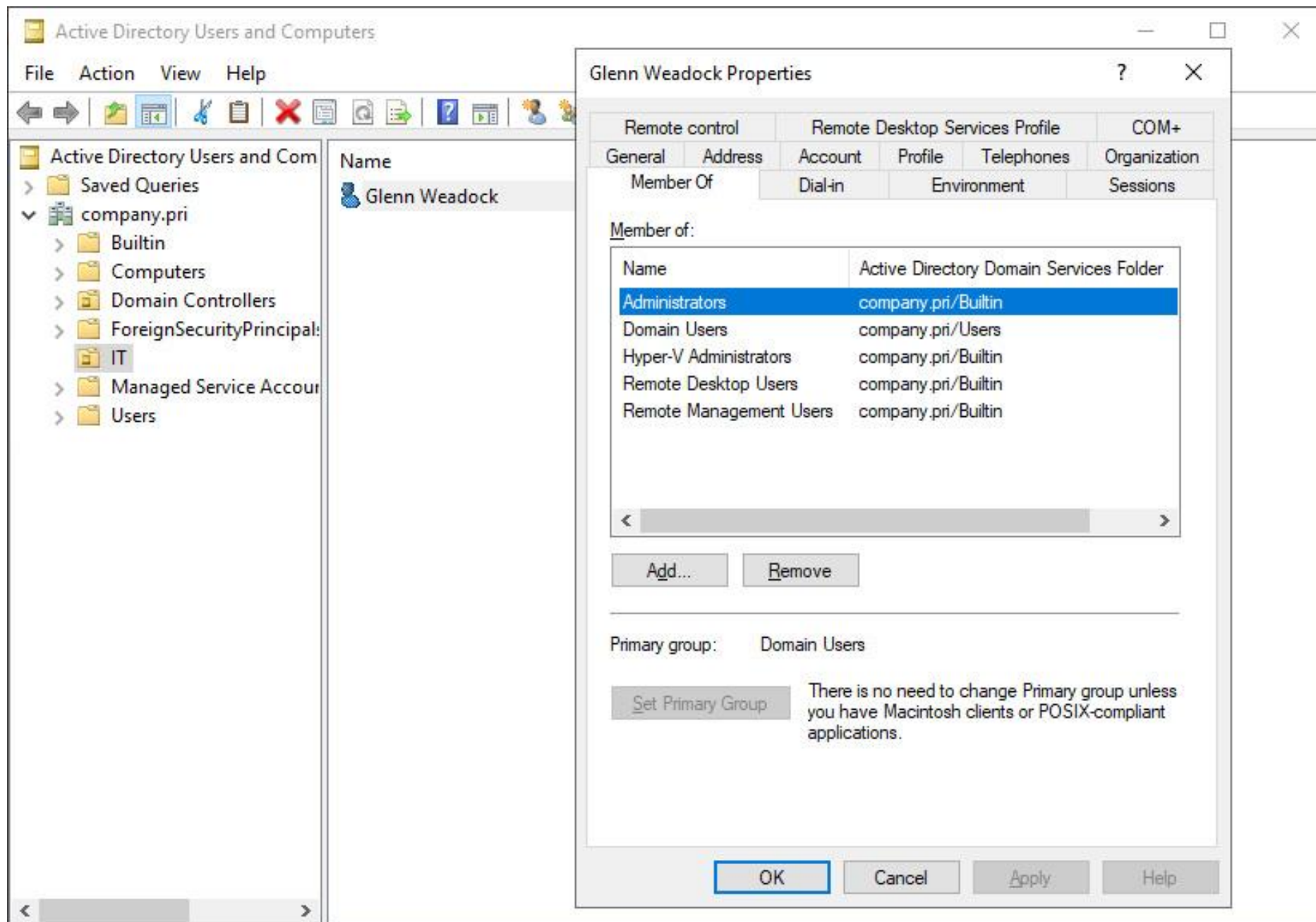


When setting up accounts to manage Hyper-V, consider the following groups:

- BUILTIN\Hyper-V Administrators
- BUILTIN\Remote Management Users
- BUILTIN\Remote Desktop Users

Domain Admin accounts will already have these rights...

...but you normally wouldn't want to make every Hyper-V admin a domain admin



Nested Virtualization



Select server roles

DESTINATION SERVER
DC.company.pri

Tools

View

Help

Before You Begin

Installation Type

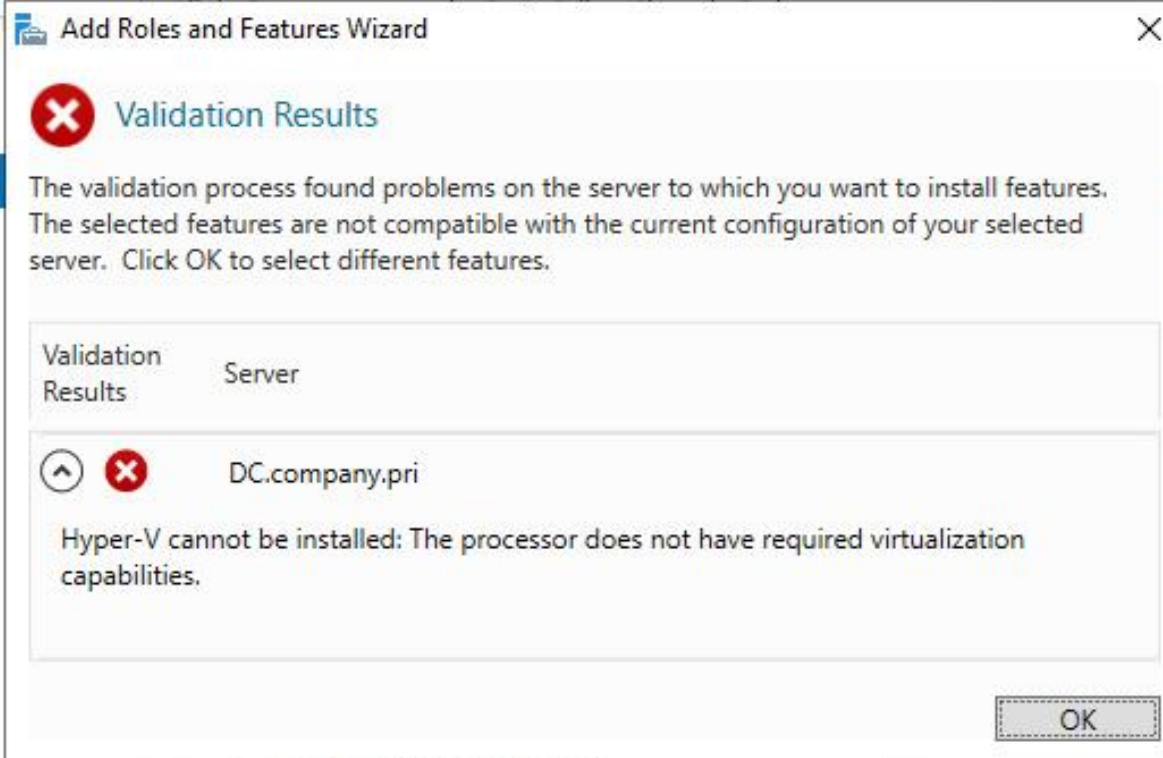
Server Selection

Server Roles

Features

Confirmation

Results



- ☐ Volume Activation Services
- ☐ Web Server (IIS)
- ☐ Windows Deployment Services

< Previous

Next >

Install

Cancel



Manageability

Events



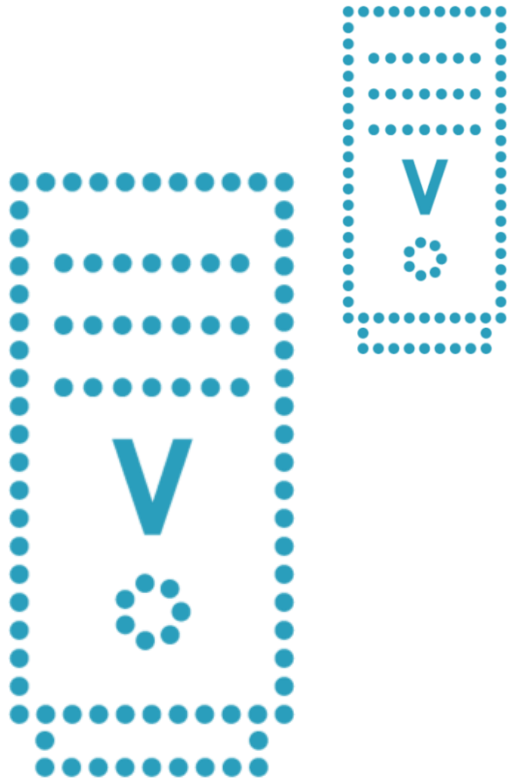
Manageability

Events

Hide



Nested Virtualization



Run Hyper-V in a virtual machine

- That VM becomes simultaneously a host and a guest

Host OS must be Server 2016+

- Intel-only CPU
- VT-x, EPT
- No Device Guard or VBS

Guest OS must (?) be Server 2016+ or Windows 10

- VM configuration must be v8.0+

Physical Host

VM1



VM2



VM3



Hyper-V Role

Hyper-V Role



Set-VMProcessor

```
-VMName <vmname>  
  
-ExposeVirtualizationExtensions  
$true
```

Get-VMNetworkAdapter

```
-VMName <vmname>  
  
| Set-VMNetworkAdapter  
  
-MacAddressSpoofing on
```

- ◀ <vmname> must be turned off (get names of VMs with “Get-VM”)
- ◀ Enables nested virtualization
- ◀ Provide routing to the nested VM
- ◀ Get the network adapter for the VM
- ◀ Pipe the output to the “Set” cmdlet
- ◀ Enable MAC address spoofing

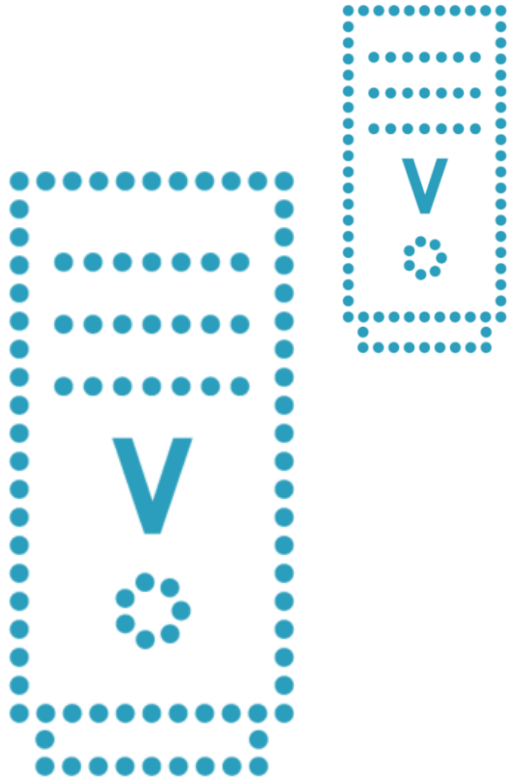




As an alternative to enabling MAC address spoofing on the guest NIC, you could set up a **NAT switch** to provide routing to the nested VM.



Nested Virtualization: Lifted Limitations



Some Microsoft documentation is outdated

Many initial restrictions no longer apply:

- Nested VMs can now be checkpointed
- Nested VMs can now be live-migrated (on Windows Server, not Windows 10)
- Some non-Microsoft operating systems can now run in grandchild partitions



You might not want to use nested virtualization in a production environment. Consider whether you can achieve your goals more simply...

...however, it's great for demos and labs (this course being Exhibit A!).



Installing an Operating System



Methods for Creating a VM



Hyper-V Manager: New > Virtual Machine

- Wizard walks you through

Windows Admin Center

- Fewer options at create time

PowerShell

- New-VM with many parameters

New Virtual Machine Wizard

Before You Begin

Before You Begin

Specify Name and Location

Specify Generation

Assign Memory

Configure Networking

Connect Virtual Hard Disk

Installation Options

Summary

This wizard helps you create a virtual machine. You can use virtual machines in place of physical computers for a variety of uses. You can use this wizard to configure the virtual machine now, and you can change the configuration later using Hyper-V Manager.

To create a virtual machine, do one of the following:

- Click Finish to create a virtual machine that is configured with default values.
- Click Next to create a virtual machine with a custom configuration.

☐ Do not show this page again

< Previous

Next >

Finish

Cancel



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Tools

Search Tools 🔍

- Events
- Files
- Firewall
- Installed apps
- Local users & groups
- Networks
- Performance Monitor
- PowerShell
- Processes
- Registry
- Remote Desktop
- Roles & features
- Scheduled tasks
- Services
- Storage
- Storage Migration Service
- Storage Replica
- System Insights
- Updates
- Virtual machines**
- Virtual switches
- Settings

Virtual machines

Summary **Inventory**[+ New](#) [< Connect](#) [⚙️ Settings](#) [More ▾](#)

<input type="checkbox"/>	Name ↑	St...	CPU usa...	Memory press...	Me
	DC	Ru...	0 %	106 %	1.0
	HyperV1	Ru...	0 %	0 %	0 B
	MyDesktop	Ru...	0 %	83 %	1.5

New virtual machine

Name *

Generation

Generation 2 (Recommended) ▾

Path ⓘ

C:\ProgramData\Microsoft\Windows\Hyp ▾

Browse

ⓘ The VM configuration and virtual hard disks are saved under C:\ProgramData\Microsoft\Windows\Hyper-V\

Virtual processors

Count

☐ Enable nested virtualization

ⓘ Simultaneous multithreading is enabled for increased performance.

Memory

Startup memory (GB) *

☐ Use dynamic memory

Minimum memory (GB)

Maximum memory (GB)

Network

Create

Cancel



```
Administrator: Windows PowerShell

NAME
    New-VM

SYNOPSIS
    Creates a new virtual machine.

SYNTAX
    New-VM [[-Name] <String>] [[-MemoryStartupBytes] <Int64>] [[-Generation] {1 | 2}] [-AsJob] [-BootDevice {Floppy |
    CD | IDE | LegacyNetworkAdapter | NetworkAdapter | VHD}] [-CimSession <CimSession[]>] [-ComputerName <String[]>]
    [-Confirm] [-Credential <PSCredential[]>] [-Experimental] [-Force] -NewVHDPATH <String> -NewVHDSIZEBYTES <UInt64>
    [-Path <String>] [-Prerelease] [-SwitchName <String>] [-Version <Version>] [-WhatIf] [<CommonParameters>]

    New-VM [[-Name] <String>] [[-MemoryStartupBytes] <Int64>] [[-Generation] {1 | 2}] [-AsJob] [-BootDevice {Floppy |
    CD | IDE | LegacyNetworkAdapter | NetworkAdapter | VHD}] [-CimSession <CimSession[]>] [-ComputerName <String[]>]
    [-Confirm] [-Credential <PSCredential[]>] [-Experimental] [-Force] [-NoVHD] [-Path <String>] [-Prerelease]
    [-SwitchName <String>] [-Version <Version>] [-WhatIf] [<CommonParameters>]

    New-VM [[-Name] <String>] [[-MemoryStartupBytes] <Int64>] [[-Generation] {1 | 2}] [-AsJob] [-BootDevice {Floppy |
    CD | IDE | LegacyNetworkAdapter | NetworkAdapter | VHD}] [-CimSession <CimSession[]>] [-ComputerName <String[]>]
    [-Confirm] [-Credential <PSCredential[]>] [-Experimental] [-Force] [-Path <String>] [-Prerelease] [-SwitchName
    <String>] -VHDPATH <String> [-Version <Version>] [-WhatIf] [<CommonParameters>]

DESCRIPTION
    The New-VM cmdlet creates a new virtual machine.

RELATED LINKS

REMARKS
    To see the examples, type: "get-help New-VM -examples".
    For more information, type: "get-help New-VM -detailed".
    For technical information, type: "get-help New-VM -full".
```




```
Administrator: Windows PowerShell

PS C:\Windows\system32> get-help new-vm -examples

NAME
    New-VM

SYNOPSIS
    Creates a new virtual machine.

Example 1

PS C:\> New-VM -Name "new 1" -MemoryStartupBytes 512MB

This example creates a new virtual machine named new 1 that has 512 MB of memory.

Example 2

PS C:\> New-VM -Name "new 2" -MemoryStartupBytes 1GB -NewVHDPATH d:\vhd\base.vhdx

This example creates a virtual machine named new 2 that has 1 GB of memory and that is connected to a new 40 GB virtual hard disk that uses the VHDX format.

Example 3

PS C:\> New-VM -Name "new 3" -MemoryStartupBytes 1GB -VHDPATH d:\vhd\BaseImage.vhdx

This example creates a virtual machine named new 3 that has 1 GB of memory and connects it to an existing virtual hard disk that uses the VHDX format.

PS C:\Windows\system32> 
```

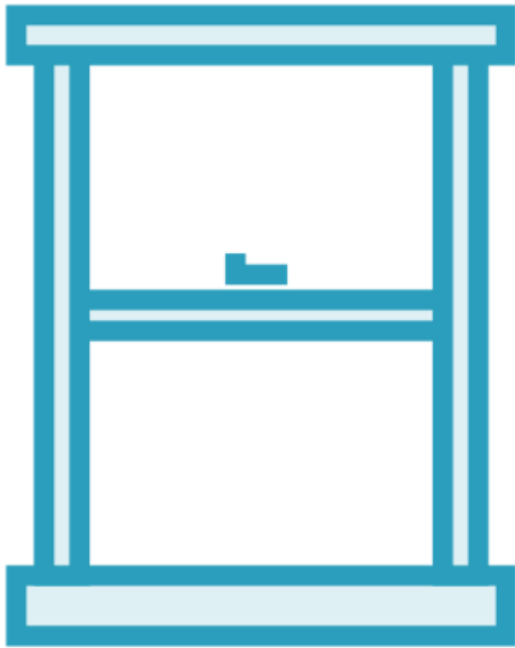




On Windows 10 systems, Hyper-V includes a “Quick Create” icon, but use Hyper-V Manager for the widest range of options.



Methods for Installing an OS



Obtain a VHD with OS preloaded

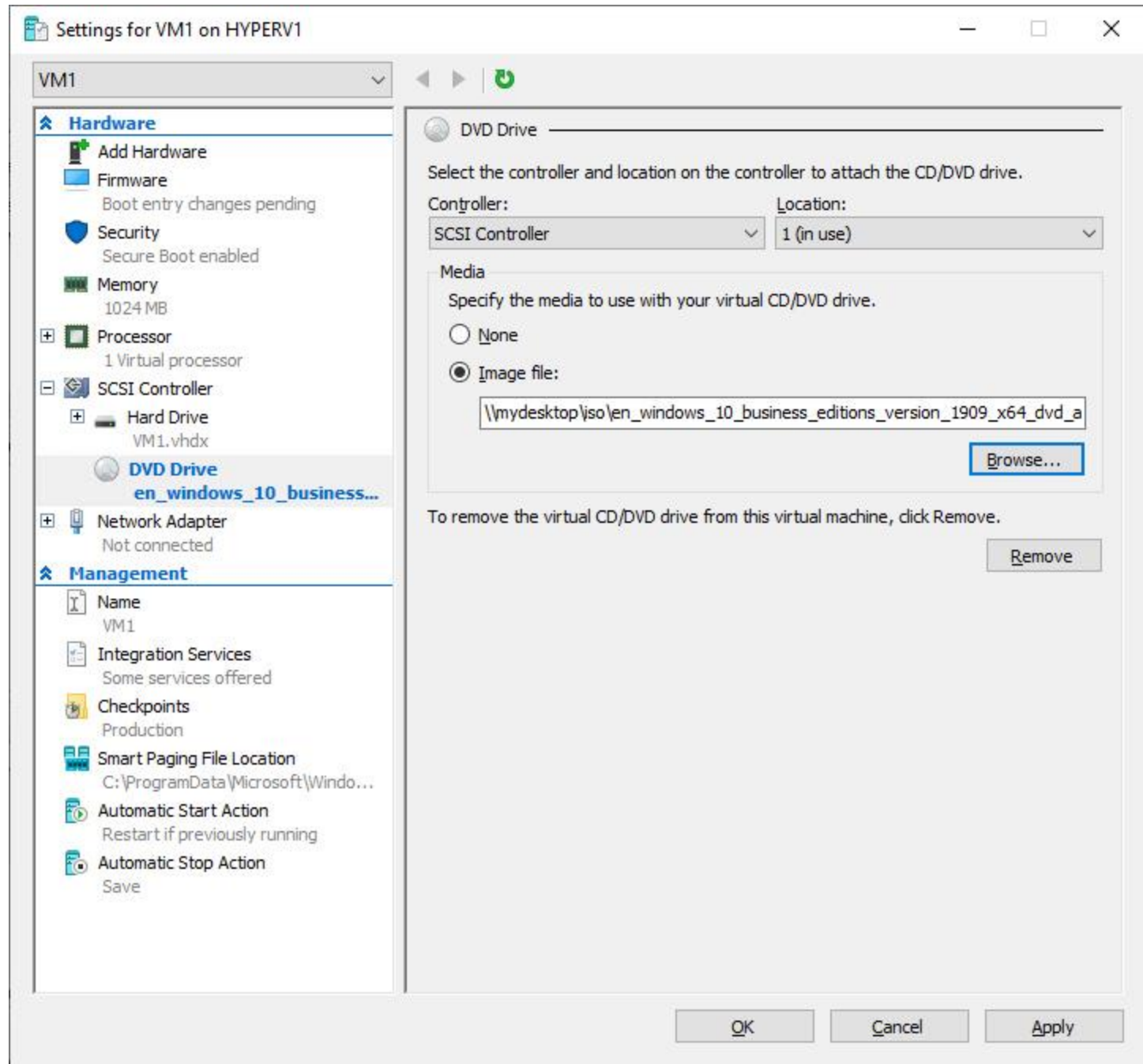
- For example, MS Evaluation Center
- “Template” VM e.g. via SCVMM

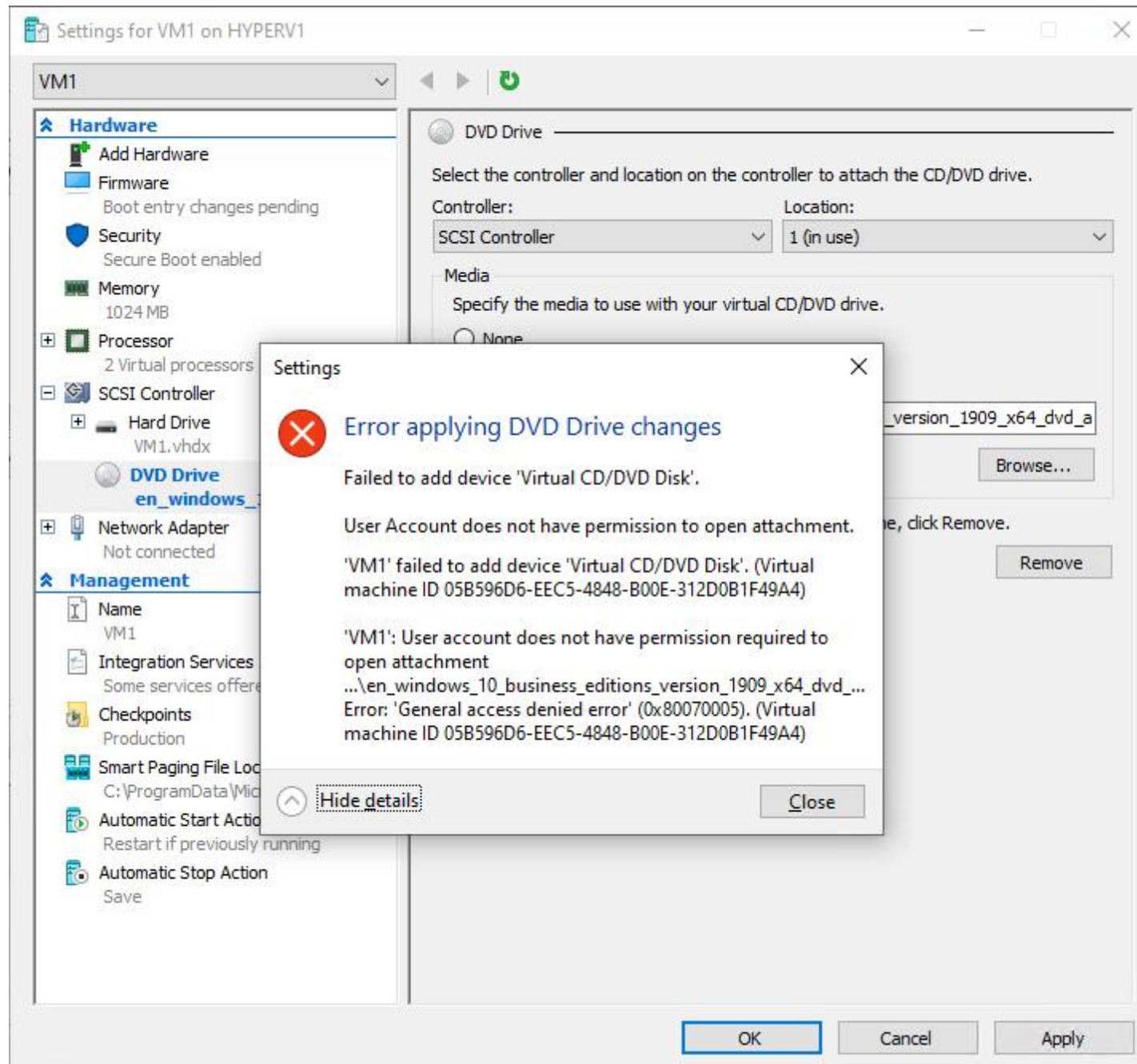
PXE-boot the VM and install the OS from the network

- Presumes the necessary infrastructure: images, WDS, etc.

Mount an ISO in a virtual DVD drive

- May require “constrained delegation”
- No physical DVD drive access in Gen2







Constrained delegation

A technique for specifying which services a specific computer can access on behalf of a user.

Implements a “trust boundary” for greater security.



Steps to Perform Constrained Delegation



Active Directory Users and Computers > properties of VM host > Delegation tab

“Trust this computer for delegation”

“Select users or computers” > specify computer sharing the ISO

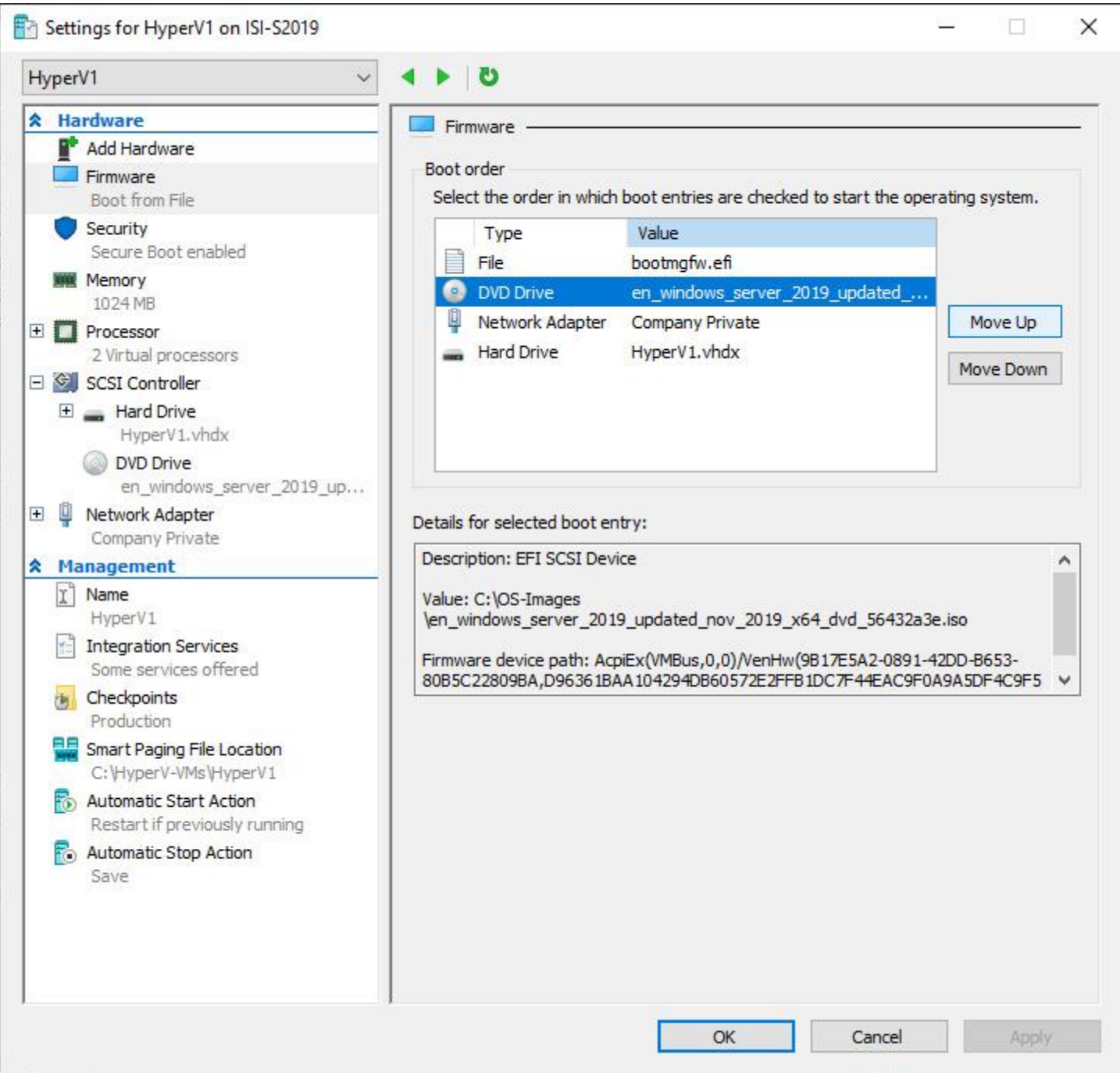
“Add services” > choose CIFS

Reboot VM host



Depending on the VM configuration, you may need to modify the boot order in the “Firmware” settings for the VM so that the virtual DVD drive is at the top.





Demo



Create a virtual machine
and install an operating system



Good work! Up Next:
Configure Virtual Machines

