A guide to Hyper-V Virtualization for Microsoft Windows 10 Operating system

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Introduction



Microsoft Hyper-V, codenamed Viridian, and briefly known before its release as Windows Server Virtualization, is a native hypervisor; it can create virtual machines on x86-64 systems running Windows. Starting with Windows 8, Hyper-V superseded Windows Virtual PC as the hardware virtualization component of the client editions of Windows NT. A server computer running Hyper-V can be configured to expose individual virtual machines to one or more networks. Hyper-V was first released with Windows Server 2008 and has been available without additional charge since Windows Server 2012 and Windows 8.

Prerequisites

Microsoft Hyper-V Utilizes not only software components to enable a virtual guest OS (Operating System) but also direct to hardware code to take advantage of specialized virtualization instructions sets in a CPU. To facilitate Hyper-V your CPU will need the following technologies: NX bit, x86-64, Intel VT-x or AMD-V, and Second Level Address Translation.

Also, a Minimum of 4 GB memory. As virtual machines share memory with the Hyper-V host, you will need to provide enough memory to handle the expected virtual workload.

In your systems BIOS you will need to enable Virtualization Technology (may have a different label depending on motherboard manufacturer) as well as Hardware Enforced Data Execution Prevention.

The Hyper-V role can be enabled on these versions of Windows 10:

- Windows 10 Enterprise
- Windows 10 Pro
- Windows 10 Education

The Hyper-V role **cannot** be installed on:

- Windows 10 Home
- Windows 10 Mobile
- Windows 10 Mobile Enterprise

You can view your systems information to make sure you are ready for virtualization by opening a command prompt window and typing in "systeminfo"

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Command Prompt	
Apps	
Node.js command prompt	>
 x64_x86 Cross Tools Command Prompt for VS 2017 	>
 x86_x64 Cross Tools Command Prompt for VS 2017 	>
 MySQL 8.0 Command Line Client - Unicode 	>
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Replace Command Prompt with Windows PowerShell in the Win + X	>
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Command Prompt

Microsoft Windows [Version 10.0.19041.928] (c) Microsoft Corporation. All rights reserved.	
C:\Users\CHRig1>systeminfo_	
Command Prompt – – – – – – – – – – – – – – – – – – –	<
(04]: Bluetooth Device (Personal Area Network) Connection Name: Bluetooth Network Connection Status: Media disconnected	Î
[05]: Hyper-V Virtual Ethernet Adapter	
DHCP Enabled: No	
IP address(es)	
[01]: 1/2.24.48.1 [02]: fe80::15e2:6ac9:76c8:9ce8	
Hyper-V Requirements: A hypervisor has been detected. Features required for	•
Hyper-V will not be displayed.	
C:\Users\CHRig1>_	~

Supported Guest Operating Systems

Guest operating system	Maximum number of virtual processors	Notes
Windows 10	32	Enhanced Session Mode does not work on Windows 10 Home edition
Windows 8.1	32	
Windows 8	32	
Windows 7 with Service Pack 1 (SP 1)	4	Ultimate, Enterprise, and Professional editions (32-bit and 64-bit).
Windows 7	4	Ultimate, Enterprise, and Professional editions (32-bit and 64-bit).
Windows Vista with Service Pack 2 (SP2)	2	Business, Enterprise, and Ultimate, including N and KN editions.
- Windows Server Semi-Annual Channel	64	
Windows Server 2019	64	
Windows Server 2016	64	
Windows Server 2012 R2	64	
Windows Server 2012	64	
Windows Server 2008 R2 with Service Pack 1 (SP 1)	64	Datacenter, Enterprise, Standard and Web editions.
Windows Server 2008 with Service Pack 2 (SP 2)	4	Datacenter, Enterprise, Standard and Web editions (32-bit and 64-bit).
Windows Home Server 2011	4	
Windows Small Business Server 2011	Essentials edition - 2, Standard edition - 4	
Ubuntu 12.04–20.04	4	
Red Hat Compatible Kernel	4	

Windows 10 can run as a guest operating system on Windows 8.1 and Windows Server 2012 R2 Hyper-V hosts.

Initial Setup: Installation

There are a few ways that you can install the Hyper-V package on your windows machine. After you have confirmed that your system has met the requirements you can follow these steps to get it installed.

Enable Hyper-V using PowerShell

1. Open a PowerShell console as Administrator.



2. Run the following command:

PowerShell

Enable-WindowsOptionalFeature -Online -FeatureName Microsoft-Hyper-V -All



This will use the windows update tool to download the package called Microsoft-Hyper-V and all its dependent services.

If the command could not be found, make sure you are running PowerShell as Administrator.

When the installation has completed, reboot.

Installation

Enable the Hyper-V role through Settings

- 1. Right click on the Windows button and select 'Apps and Features'.
- 2. Select Programs and Features on the right under related settings.
- 3. Select Turn Windows Features on or off.
- 4. Select Hyper-V and click OK.

Windows Features	_		\times
Turn Windows features on or off			?
To turn a feature on, select its check box. To turn check box. A filled box means that only part of th	a feature o e feature i	off, clear it s turned o	ts in.
.NET Framework 3.5 (includes .NET 2.0	and 3.0)		^
.NET Framework 4.6 Advanced Services	5		
Active Directory Lightweight Directory	Services		
Embedded Boot Experience			
Embedded Logon			
Embedded Shell Launcher			
🖃 🗹 📊 Hyper-V			
Hyper-V Management Tools			
🗉 🗹 🚽 Hyper-V Platform			
Internet Explorer 11			
Internet Information Services Hostable	Web Core		¥
	ОК	Canc	el

When the installation has completed you are prompted to restart your computer.

Creating a Virtual Machine with v1709 Host OS

You can view Video instructions here.

To create a new virtual machine in Fall Creators Update:

1. Open "Hyper-V Quick Create" from the start menu.

All	Apps	Documents	Web	More 🔻	
Best n	natch				
1	Hyper-V App	Quick Create	1		
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́Рh	yper-v qu	i - See web resu	ılts	>	
ρh	iyper-v qu	ick migration		>	
,Р h	iyper-v qu	ick creator		>	C
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۶h	iyper-v qu	ick-create		>	
ρh	iyper-v qu	ick create		>	
۶h	iyper-v qu	ick sync		>	
۶ r	iyper-v qu	ick create do	wnload	>	
۶h	iyper-v qu	ick Create			0

2. Select an operating system or choose your own by using a local installation source.



- a) If you want to use your own image to create the virtual machine, select Local Installation Source.
- b) Select Change Installation Source.

🧊 Create Virtual Machine	- 🗆 X	
Select an operating system Windows 10 dev environment Windows 10 with Microsoft Edge Ubuntu 18.04 LTS Sarah's Dev VM	You can install from an ISO image file (.iso) or a virtual hard disk file (.vhd or .vhdx). Change installation source Inis virtual machine will rum Windows (enables Windows Secure Boot)	
Local installation source		
	Mo <u>r</u> e options 🛇	
<u>C</u> lose	Create <u>V</u> irtual Machine	

- c) Pick the .iso or .vhdx that you want to turn into a new virtual machine.
- d) If the image is a Linux image, deselect the Secure Boot option. To disable Windows launch security that may interfere with your Linux VM start up.

🔰 Create Virtual Machine			- 🗆 X
Select an operating system			
Windows 10 dev environment You ca	n install from an ISC) image file (.iso) or a virtual hard disk file (.	vhd or .vhdx).
Windows 10 with Microsoft Edge		Change installation source	
📀 Ubuntu 18.04 LTS	is victual machine w	II run Windows	
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Local installation source			
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3. Select "Create Virtual Machine" Then Hyper-V Quick Create will take that ISO file build a virtual network adapter, assign it to the Virtual machine and launch the Machine for you.

CREATING A VIRTUAL MACHINE WITH V1607 AND EARLIER HOST OS

1. Open the **PowerShell ISE as Administrator**.



2. Select the New Script Button



3. Copy and paste the script below into the edit window.

```
# Set VM Name, Switch Name, and Installation Media Path.
$VMName = 'TESTVM'
$Switch = 'Default Switch'
$InstallMedia = 'C:\Users\Administrator\Desktop\en_windows_10_enterprise_x64_dvd_6851151.iso'
# Create New Virtual Machine
New-VM -Name $VMName -MemoryStartupBytes 2147483648 -Generation 2 -NewVHDPath "D:\Virtual
Machines\$VMName\$VMName.vhdx" -NewVHDSizeBytes 53687091200 -Path "D:\Virtual Machines\$VMName"
-SwitchName $Switch
# Add DVD Drive to Virtual Machine
Add-VMScsiController -VMName $VMName
Add-VMDvdDrive -VMName $VMName -ControllerNumber 1 -ControllerLocation 0 -Path $InstallMedia
# Mount Installation Media
$DVDDrive = Get-VMDvdDrive -VMName $VMName
# Configure Virtual Machine to Boot from DVD
Set-VMFirmware -VMName $VMName -FirstBootDevice $DVDDrive
```

- 4. Modify Lines 4 and 7
 - 1. Set line 4 to the directory location of your iso file that houses your new guest OS that we are creating.
 - 2. Set the two directory locations on line 7 to a place on your machine where you would like to store the virtual hard drive for this guest OS.

5. Run the following script by pressing the **green play button** in the ribbon.



6. Once the Script is Completed and the Green Play button Appears again, you should have a new Virtual Machine created.

Managing the Virtual machine

14256 😨 🗟 ... Best match Hyper-V Manager Арр Apps Hyper-V Manager 🟮 Hyper-V Quick Create > App Search the web > _____ □___Ope Settings (1) Run as administrator Den file location Photos (1+) Folders (1+) -🖽 Pin to Start Documents (13+) -⇔ Pin to taskbar O 🛱 💽 🧱 🛱 🔁 🕅 🐼

To access the GUI management tool for Hyper-V Search for "Hyper-V Manager" in the start menu.

In Hyper-V Manager you can manage the virtual machines that we created above. This Tool can also connect to remote servers and desktops and allow you to administer changes and connect to virtual sessions from a different machine as well.

Hyper-V Manager		– 🗆 X
File Action View Help		
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📰 Hyper-V Manager	Act	tions
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	Configuration Version: 9.0	Move
	Generation: 2	Export
	Notes: None	Rename
		C Delete
		Help
	Summary Memory Networking	

Adjusting Ram Allocation for a guest VM

1. In Hyper-V Manager **right click on the VM** you wish to modify from the list of virtual machines. Then **select Settings**...

Hyper-V Manager	Nachines				
Name	^	State	CPU Usage	Assigned Memory	Uptime
📱 Windo	ows 10 dev <u>environm</u>	Off		3 3	
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	Se	ttings			
	Sta	art			
	Ch	neckpoint			
	Re	vert			
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Checking	Ex	port			
	Notematia C Re	ename	imment (4/1	1/2021 0-51-20 PM)	
	Now De	elete	vironment - (4/ I	1/2021 - 5:51:25 PMI)	
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Window	s 10 dev environn	nent			
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Window	s 10 dev environn Created: Configur Generati Notes:	nent : ration Version: ion:	2/2/2021 9:46:09 P 9.0 2 None	M Clustered: N	lo

- 2. In the Settings menu Select the **Memory section**. Enter the amount of RAM you wish to allocate in the first Field.
- 3. Then select Apply.

li	indows 10 dev environment 🤍 🗸	3 4 ⊳
•	Hardware Add Hardware Firmware Boot from File Security Secure Boot enabled Memory	Memory Specify the amount of memory that this virtual machine can use. RAM: 2048 Dynamic Memory You can allow the amount of memory available to this virtual machine to change
-	2048 MB Processor 4 Virtual processors SSI Controller Hard Drive Windows 10 dev environment	You can allow the amount of memory available to this virtual machine to change dynamically within the range you set. Enable Dynamic Memory Minimum RAM: Maximum RAM: Maximum RAM:
+ *	 Network Adapter Default Switch Management Name Windows 10 dev environment Integration Services All services offered Checkpoints Standard Smart Paging File Location C:\ProgramData\Microsoft\Windo Automatic Start Action Restart if previously running Automatic Stop Action Save 	Specify the percentage of memory that Hyper-V should try to reserve as a buffer. Hyper-V uses the percentage and the current demand for memory to determine an amount of memory for the buffer. Memory buffer: 20 % Memory weight Specify how to prioritize the availability of memory for this virtual machine compared to other virtual machines on this computer. Low High Specifying a lower setting for this virtual machine might prevent it from starting when other virtual machines are running and available memory is low.

Here you can establish how much RAM you want to allow the VM to have allocated. This RAM is allocated from the RAM that is available inside the physical Host computer. When selecting a new value, you want to make sure that you leave enough RAM for the host OS' processes to function correctly and the same for the guest OS.

Hyper-V also has the ability to allocate memory on the fly with Dynamic memory allocation. This allows the Host OS to retain some of the Guest OS' RAM until the Guest OS is in demand for more This can be set in the **Dynamic Memory** Subsection.

Creating a Rollback Checkpoint

1. In Hyper-V Manager **left click on the VM** to select the instance you wish to capture from the list of virtual machines.

Hyper-V Manager					_		×
File Action View Help							
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뜸 Hyper-V Manager			Actions				
ERIG1	Virtual Machines		CHR	IG1			
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				Hyper-V Settings			
				Virtual Switch Manager			
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			-				
	Summary Memory Networking						
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2. Then on the right pane under the instance name ("Windows 10 dev environment" for me) subsection Select **checkpoint.**

Hyper-V Manager					- 0	ı × I
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Hyper-V Manager	Virtual Machines		Actions			
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	Generation	n: 2			🛒 Rename	
	Notes:	None			E Delete	
					👔 Help	
	Summary Memory Networkin	9				
	<			>		
CHRIG1: 1 virtual machir	e selected.					

3. Then you can View or act on the checkpoint from the **checkpoints pane** in the middle of the manager.

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4. You can open the submenu by right clicking on the checkpoint you created.

Automatic Checkpoint - Windows 10) dev environment - (4/11/2021 - 9:51:29 PM) (4/05/0001 - 7:00-50 PM) Settings Apply Export Rename Delete Checkpoint Delete Checkpoint Subtree Help	
Windows 10 dev environment - (4/25/	/2021 - 7:33:53 PM)	
Created:	4/25/2021 7:33:54 PM	Ì

In this submenu you can

- View the **Settings** that where in effect when this checkpoint was taken.
- You can **Apply** the checkpoint and rollback to the point in time the checkpoint was taken Data and settings.
- You can **Export** the checkpoint configuration for migrating to a new machine as a file.
- You can **Rename** the checkpoint.
- You can **Delete** the Checkpoint or the checkpoint and every checkpoint below it.

Credits

• Microsoft Documents <u>https://docs.microsoft.com/en-us/virtualization/hyper-v-on-windows/about/</u>