

Windows 10 - Hyper-V

Virtualizácia pre začiatočníkov od A po Z

Daniel BAČA

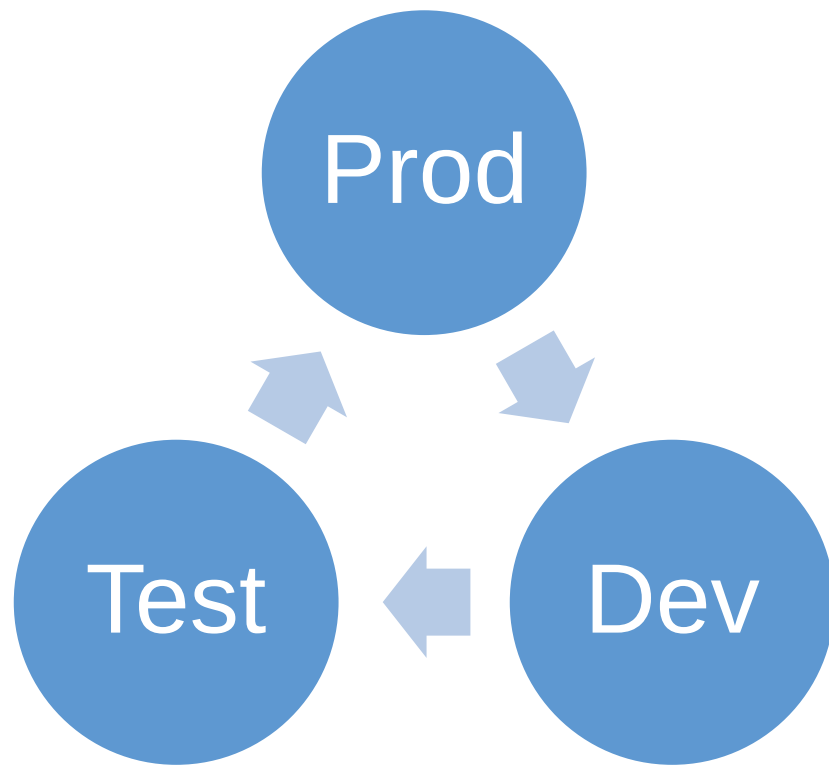
daniel.baca@wug.sk

1. 11. 2018 Praha

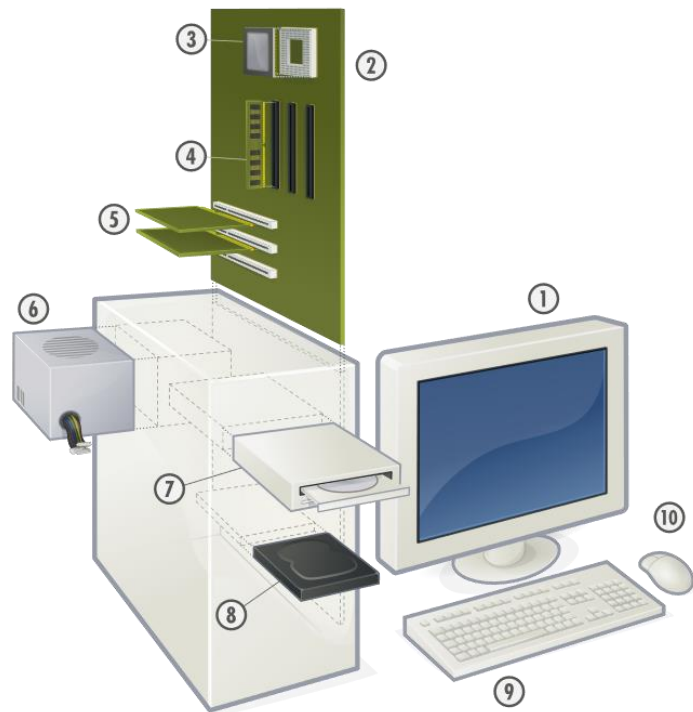
Osnova

1. O mne
2. Čo je to virtualizácia
3. Aká je konkurencia
4. Hyper – V

Vývojový cyklus



Osobný počítač



(2) matičná doska

(3) Procesor - CPU

(4) Pamäť - RAM

(5) Sieťová karta – LAN

(8) Pevný disk – Disk

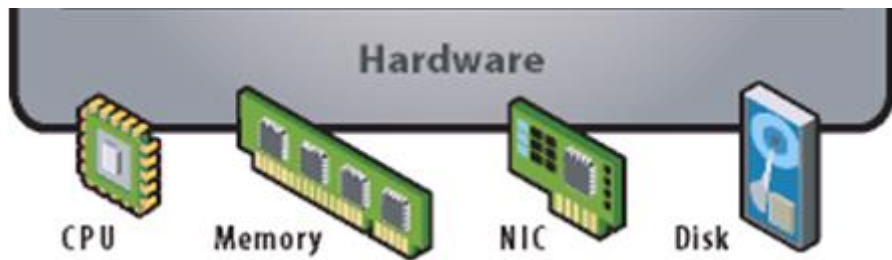
(6) Zdroj

(1) monitor

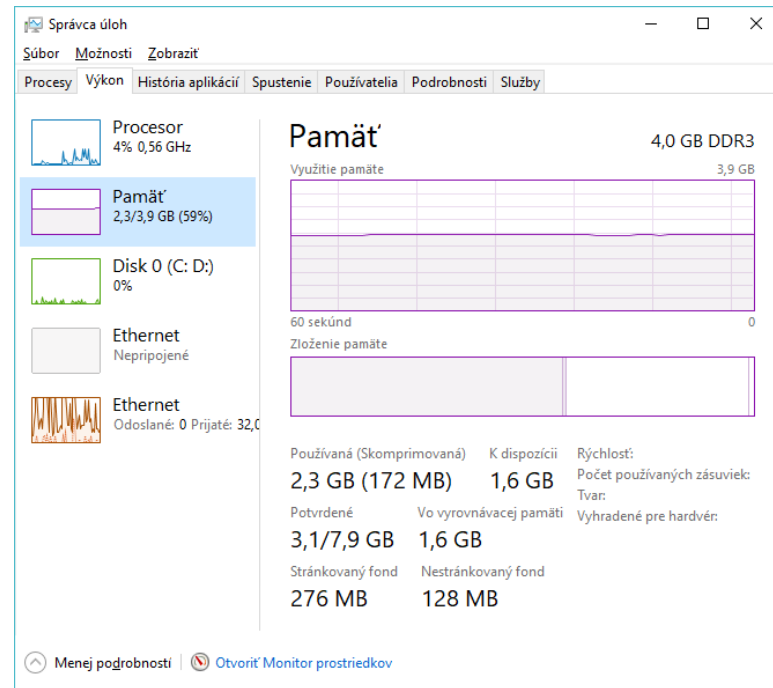
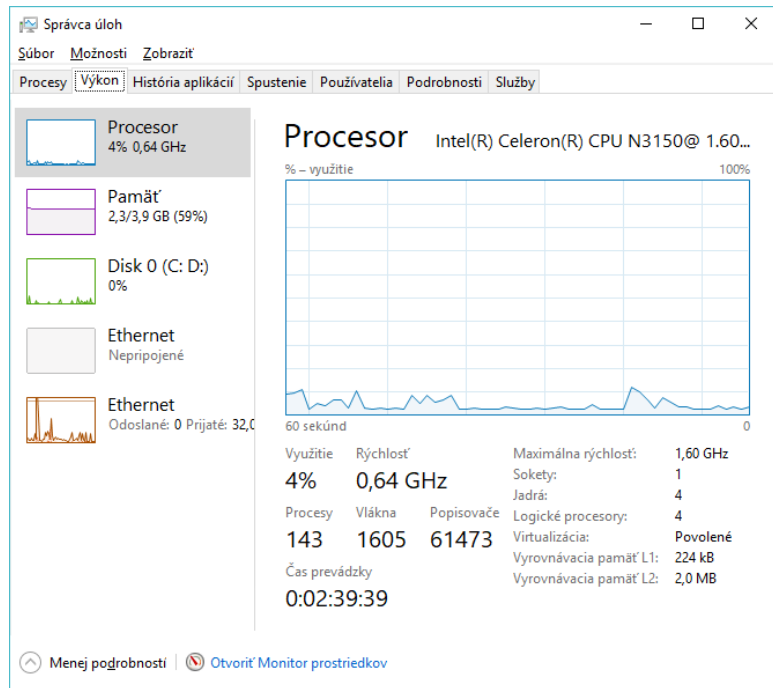
(7) Optická mechanika

(9) Klávesnica

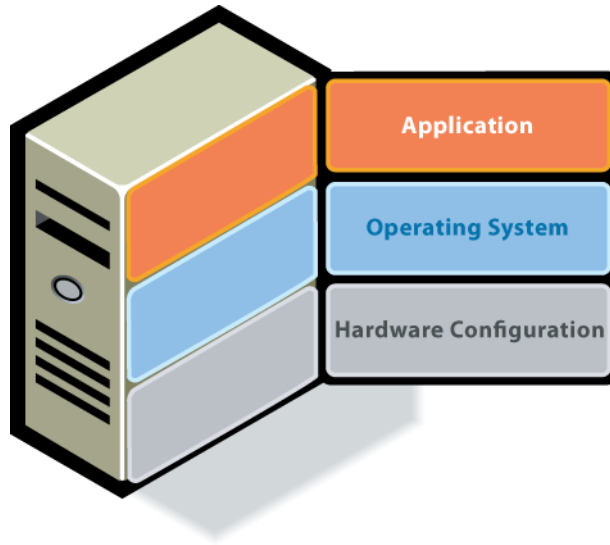
(10) Myš



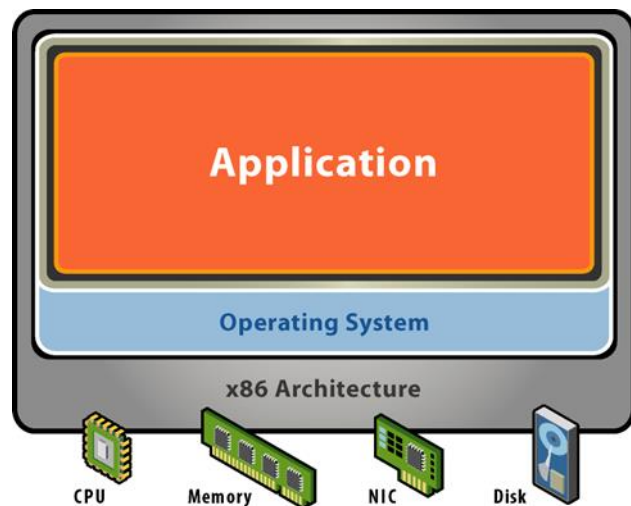
Využitie počítača



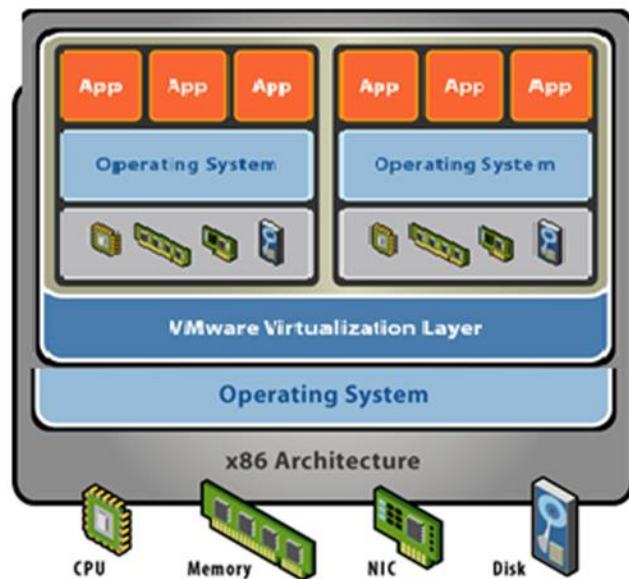
Virtualizácia



Bez virtualizácie



S virtualizáciou



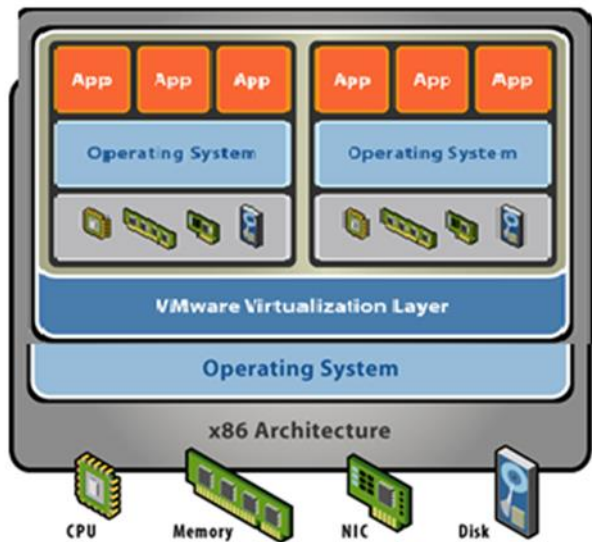
Virtualizačné programy



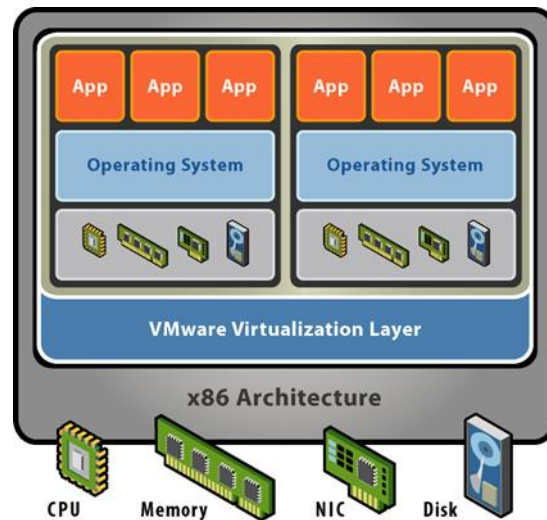
- Hyper - V
- VmWorkstation
- VirtualBox

Typy virtualizácie

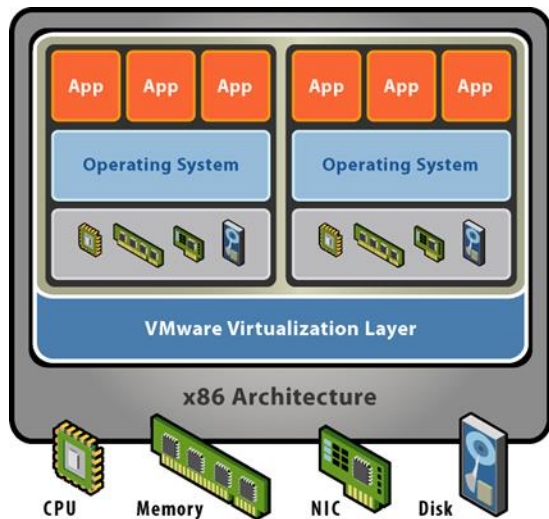
Host-based



Bare-Metal

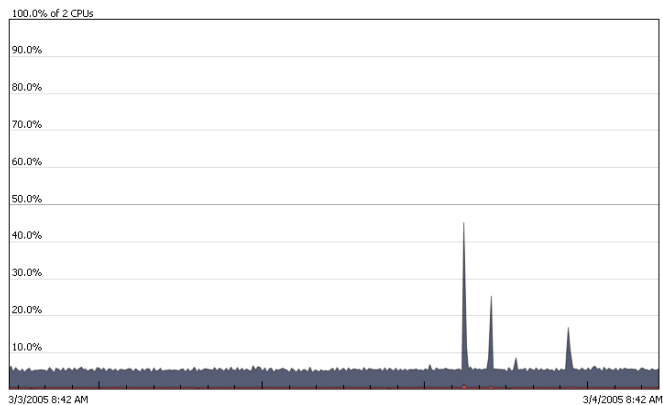


Typy virtualizácie

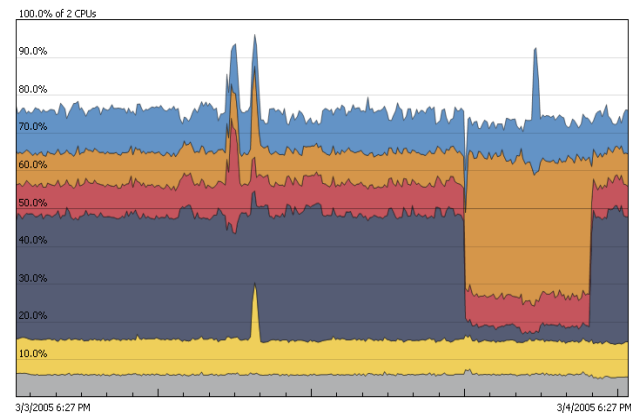


- Hyper – V server
- vmWare

Pred virtualizáciou



S virtualizáciou



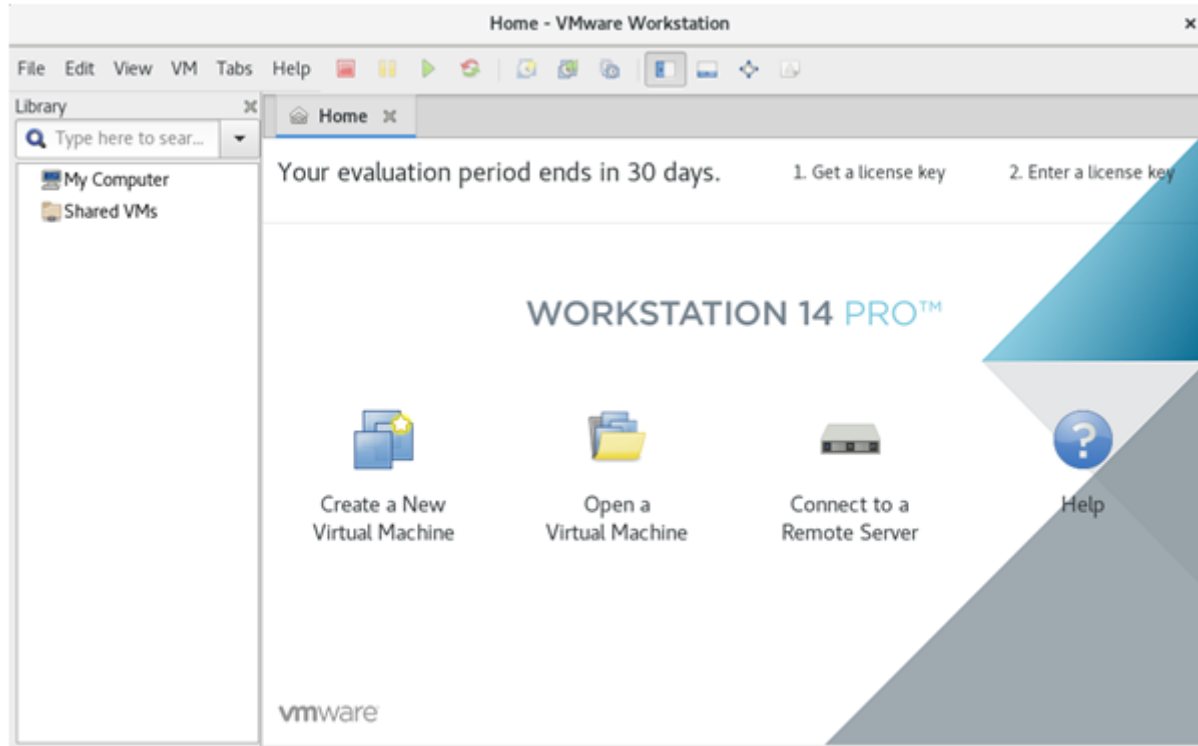
Linux vo Windows Store



Konkurencia

- 
- VMware Workstation 14 Pro
 - Oracle VM VirtualBox

VMware Workstation 14 Pro



Host Operating Systems (64-bit)

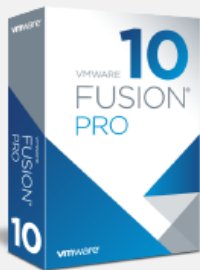
- Windows 7, 8, 10
- Windows Server 2008, 12, 16
- Ubuntu 14.04 and above
- Red Hat Enterprise Linux 6 & above
- CentOS 6.0 and above
- Oracle Linux 6.0 and above
- openSUSE Leap 42.2 and above
- SUSE Linux 12 and above

Guest Operating Systems

More than 200 operating systems are supported, including:

- Windows 10
- Windows 8.X
- Windows 7
- Windows XP
- Ubuntu
- Red Hat
- SUSE
- Oracle Linux
- Debian
- Fedora
- openSUSE
- Mint
- CentOS

Local Desktop Virtualization



Fusion 10 Pro

Designed for advanced users, developers, QA, and IT.

176,95 €

131,95 €

Buy

Upgrade



Fusion 10

The ultimate Windows on Mac experience.

88,95 €

54,94 €

Buy

Upgrade



Workstation 14 Pro

Leading Edge PC Virtualization.

274,95 €

165,95 €

Buy

Upgrade



Workstation 14 Player

Streamlined PC Virtualization for

Business.

165,95 €

88,95 €

Buy

Upgrade



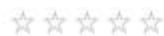
Windows 10 Home



145,00 €

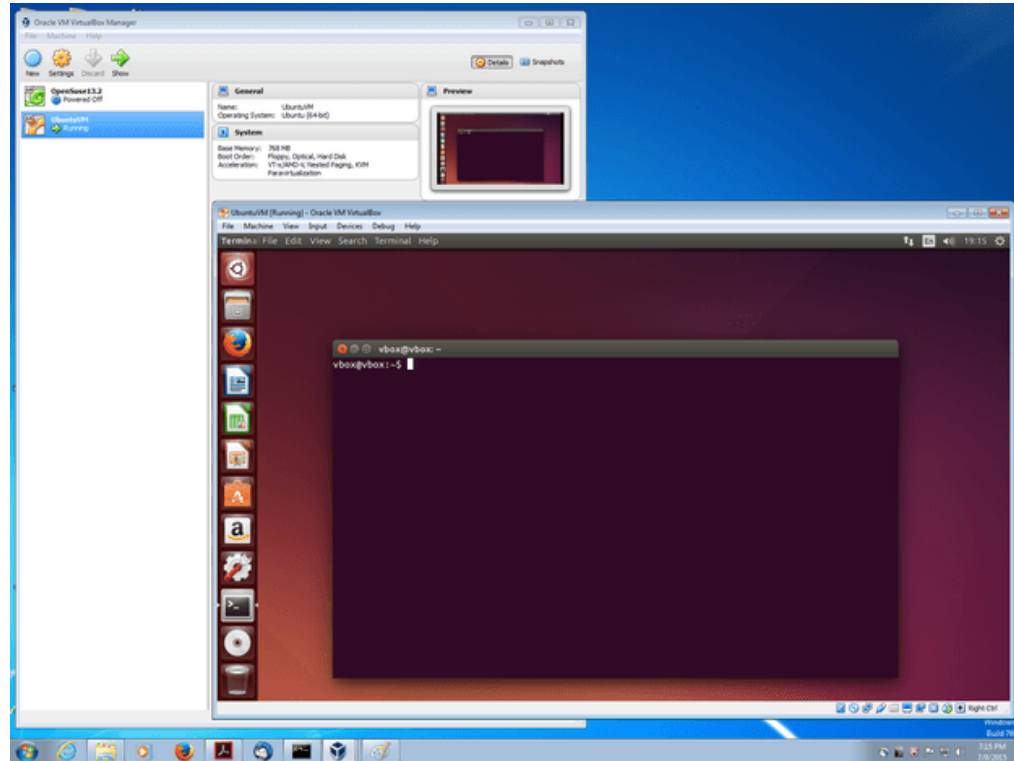


Windows 10 Pro

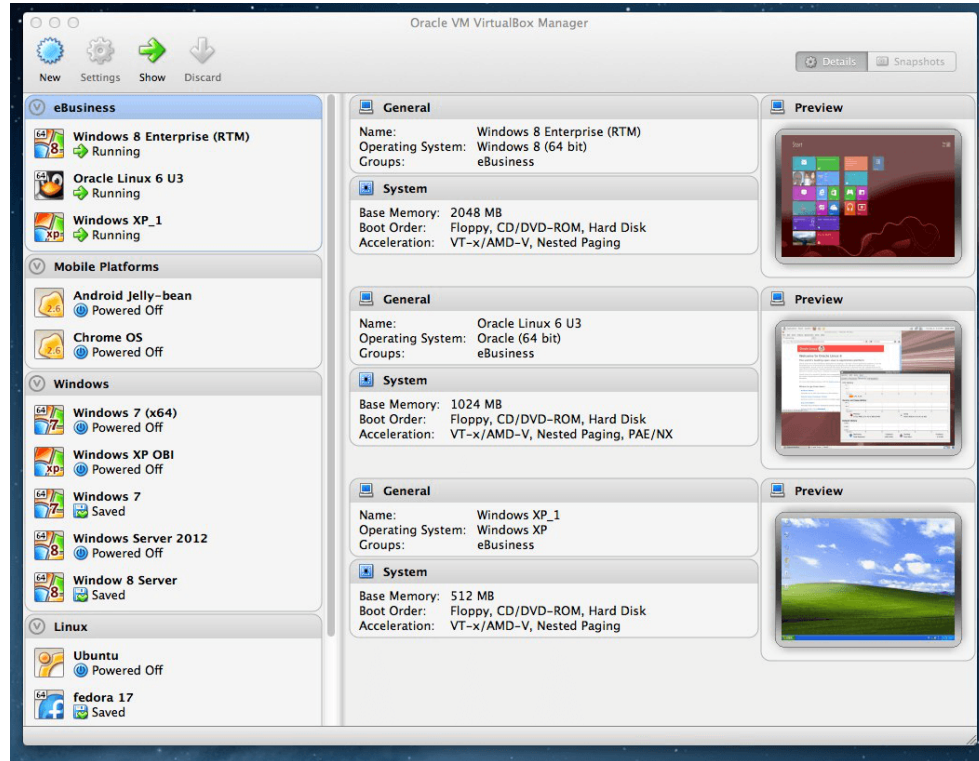


259,00 €

Oracle VM VirtualBox



Oracle VM VirtualBox



Host Operating Systems

- Windows
- Linux
- Macintosh
- Solaris

Guest Operating Systems

- Windows 10
- Windows 8.X
- Windows 7
- Windows XP
- Ubuntu
- Red Hat
- SUSE
- Oracle Linux
- Debian
- Fedora
- openSUSE
- CentOS
- Mac OS X Server

VirtualBoxes – Free VirtualBox Images

GNU/Linux (GNU userland tools running on top of the [Linux kernel](#))

- [Archlinux](#) (website).
- [CentOS](#) (website): the installation is done from the DVD, with default parameters set
- [Damn Small Linux](#) (website): the installation is done from the CD, with default parameters set.
- [Debian](#) (website): the installation has been done from the netinstall ISO image for the x86 architecture.
- [DeLi Linux](#) (website).
- [Dreamlinux](#): the installation has been done from the CD, with default parameters set.
- [Fedora](#) (website).
- [Fluxbuntu](#) (website): the installation is done from the CD, with default parameters set.
- [Gentoo](#) (website): the installation is done from the ISO image, then customized .
- [gNewSense](#) (website): the installation is done from the CD, with default parameters set.
- [gOS](#) (website).
- [Kubuntu](#) (website): the installation is done from the CD, with default parameters set.
- [LinuxMint](#) (website): the installation is done from the CD, with default parameter set.
- [Lubuntu](#) (website): the installation is done from the CD, with default parameter set.
- [Mandriva](#) (website): the installation is done from the CD, with default parameters set.
- [Manjaro](#) (website): the installation is done from the CD, with default parameters set.
- [Moblin 2](#) (website): the installation is done from the .img/.iso file provided by the project.
- [moonOS](#) (website).
- [OpenSUSE](#) (website).
- [PCLinuxOS](#) (website).
- [Puppy Linux](#) (website).
- [Sidux](#) (website).
- [Slackware](#) (website): the installation has been done from the first CD, selecting the bare minimum disk sets.
- [SlitTaz](#) (website)
- [Tiny Core Linux](#) (website)
- [TinyMe](#) (website)
- [Ubuntu](#) (website): the installation is done from the CD, with default parameters set.
- [Ubuntu Server](#) (website): the installation is done from the CD.
- [Ubuntu Studio](#) (website): the installation is done from the CD, with default parameters set
- [Xubuntu](#) (website): the installation is done from the CD, with default parameters set.
- [VectorLinux](#) (website): the installation is done from the CD, with default parameters set.
- [Zenwalk](#) (website): the installation is done from the Standard Edition CD, with default parameters set.

GNU/OpenSolaris (GNU userland tools running on top of the [OpenSolaris kernel](#))

- [OpenSolaris](#) (website).
- [Nexenta](#) (website): the installation is done from the CD.
- [MILAX](#)(website): the installation has been done from the official ISO image.

GNU/FreeBSD (GNU userland tools running on top of the [FreeBSD kernel](#))

- [Debian GNU/kFreeBSD](#) (website): the installation has been done from the daily mini.iso.

BSD

- [FreeBSD](#) (website): the installation is done from the bootonly iso

Other

- [AROS](#) (website): the installation has been done from the nightly build ISO image.
- [FreeDOS](#) (website): the installation has been done from the official ISO image.
- [Haiku](#) (website): the image has been done from the nightly build HDD raw image.
- [MINIX](#) (website): the installation has been done from the official ISO image (MINIX 3).
- [ReactOS](#) (website): the installation has been done from the official ISO image.
- [SYLLABLE](#) (website): the installation has been done from the official ISO image.
- [Android-x86](#) (website): the installation has been done from the daily ISO image.
- [Plan 9](#) (website): the installation has been done from the ISO image.



Hyper-V

Hardware Requirements

- 64-bit Processor with Second Level Address Translation (SLAT)
- CPU support for VM Monitor Mode Extension (VT-c on Intel CPU's)
- EPT Support
- minimum of 4 GB RAM memory for the Host

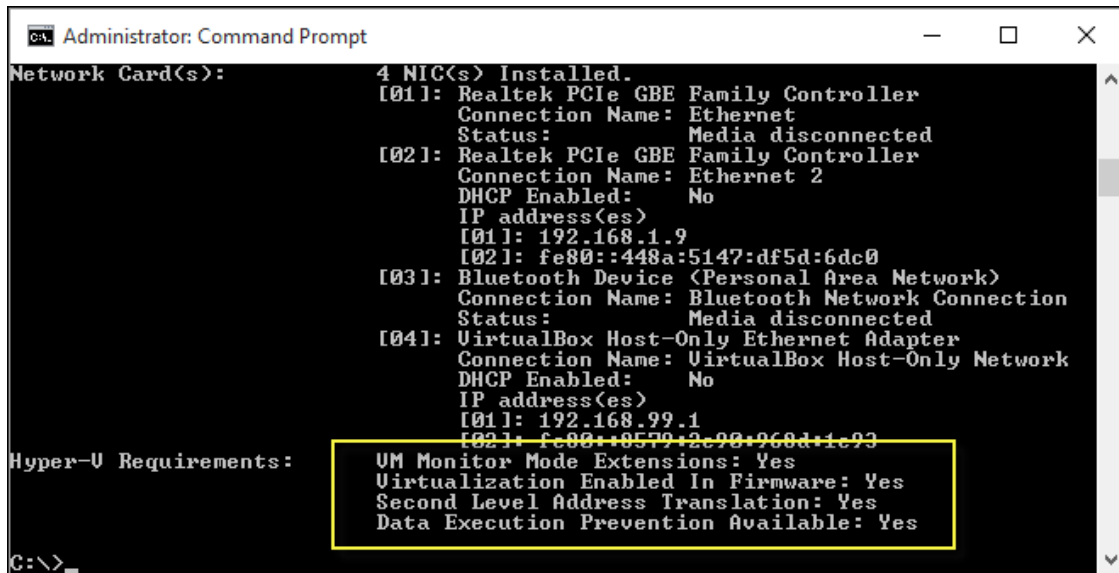
BIOS Requirements

The following items will need to be enabled in the system BIOS:

- Virtualization Technology - may have a different label depending on motherboard manufacturer.
- Hardware Enforced Data Execution Prevention

Verify Hardware Compatibility

systeminfo.exe



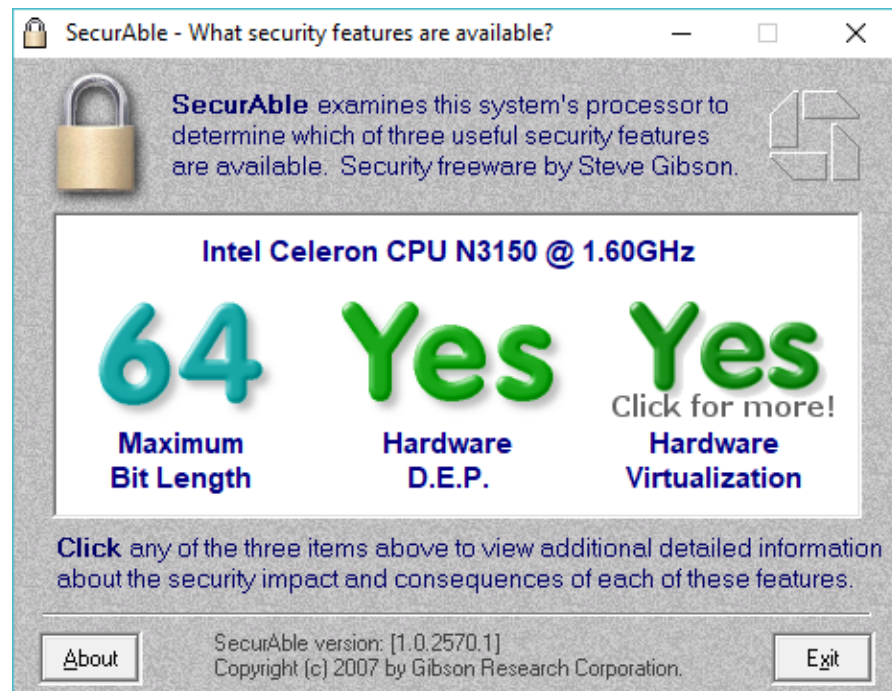
```
Administrator: Command Prompt

Network Card(s):      4 NIC(s) Installed.
                      [01]: Realtek PCIe GBE Family Controller
                        Connection Name: Ethernet
                        Status:          Media disconnected
                      [02]: Realtek PCIe GBE Family Controller
                        Connection Name: Ethernet 2
                        DHCP Enabled:    No
                        IP address(es)
                        [01]: 192.168.1.9
                        [02]: fe80::448a:5147:df5d:6dc0
                      [03]: Bluetooth Device (Personal Area Network)
                        Connection Name: Bluetooth Network Connection
                        Status:          Media disconnected
                      [04]: VirtualBox Host-Only Ethernet Adapter
                        Connection Name: VirtualBox Host-Only Network
                        DHCP Enabled:    No
                        IP address(es)
                        [01]: 192.168.99.1
                        [02]: fe80::8579:2c90:968d:1c93

Hyper-V Requirements: VM Monitor Mode Extensions: Yes
                      Virtualization Enabled In Firmware: Yes
                      Second Level Address Translation: Yes
                      Data Execution Prevention Available: Yes

C:\>
```

SecurAble



Hyper-V

- Hyper-V on Windows
- Hyper-V on Windows Server

Hyper-V

Hyper-V features only available on Windows 10

- Quick Create and the VM Gallery
- Default network (NAT switch)

Hyper-V features available in Windows Server only

- Virtualizing GPUs using RemoteFX
- Live migration of virtual machines from one host to another
- Hyper-V Replica
- Virtual Fiber Channel
- SR-IOV networking
- Shared .VHDX

Operating System Requirements

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

Note

Windows 10 Home edition **can be upgraded** to Windows 10 Professional.

Settings > Update and Security > Activation. Here you can visit the store and purchase an upgrade.

Windows 10 editions - compare

Features	Home	Pro	Enterprise	Education
Domain Join		✓	✓	✓
Azure Active Directory Domain Join, with single sign-on to cloud-hosted apps ¹⁶		✓	✓	✓
Enterprise Mode Internet Explorer (EMIE)		✓	✓	✓
Remote Desktop		✓	✓	✓
Client Hyper-V		✓	✓	✓
Windows to Go			✓	✓
BranchCache			✓	✓

Supported guest operating systems

Guest operating system	Maximum number of virtual processors	Notes
Windows 10	32	
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.

Supported guest operating systems

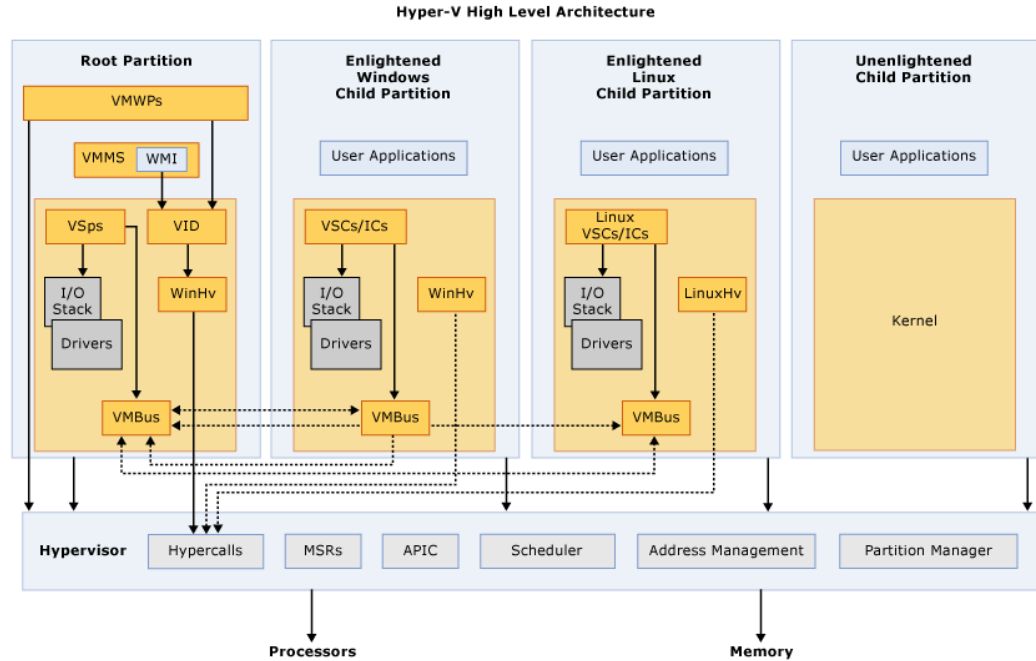
Guest operating system	Maximum number of virtual processors	Notes
Windows Server 2012 R2	64	
Windows Server 2012	64	
Windows Server 2008 R2 with Service Pack 1 (SP 1)	64	Datacenter, Enterprise, Standard and Web editions.
Windows Server 2008 with Service Pack 2 (SP 2)	4	Datacenter, Enterprise, Standard and Web editions (32-bit and 64-bit).
Windows Home Server 2011	4	
Windows Small Business Server 2011	Essentials edition - 2, Standard edition - 4	

Supported guest operating systems

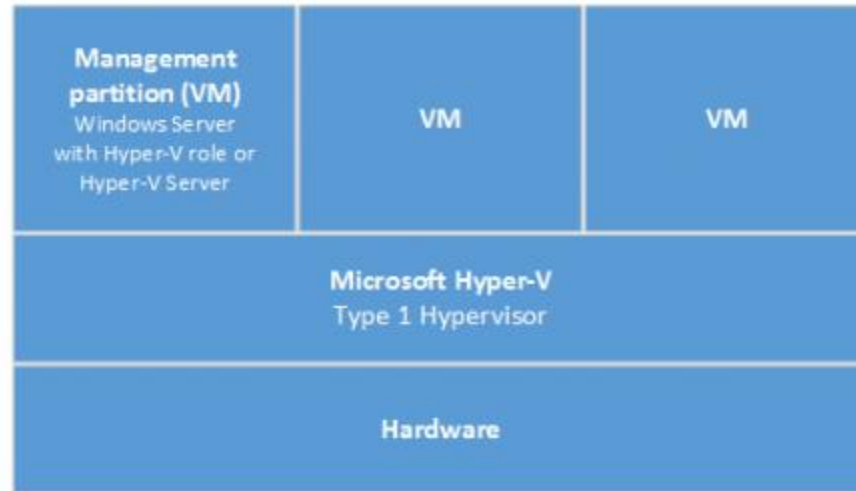
Supported Linux and Free BSD

Guest operating system	
CentOS and Red Hat Enterprise Linux	
Debian virtual machines on Hyper-V	
SUSE	
Oracle Linux	
Ubuntu	
FreeBSD	

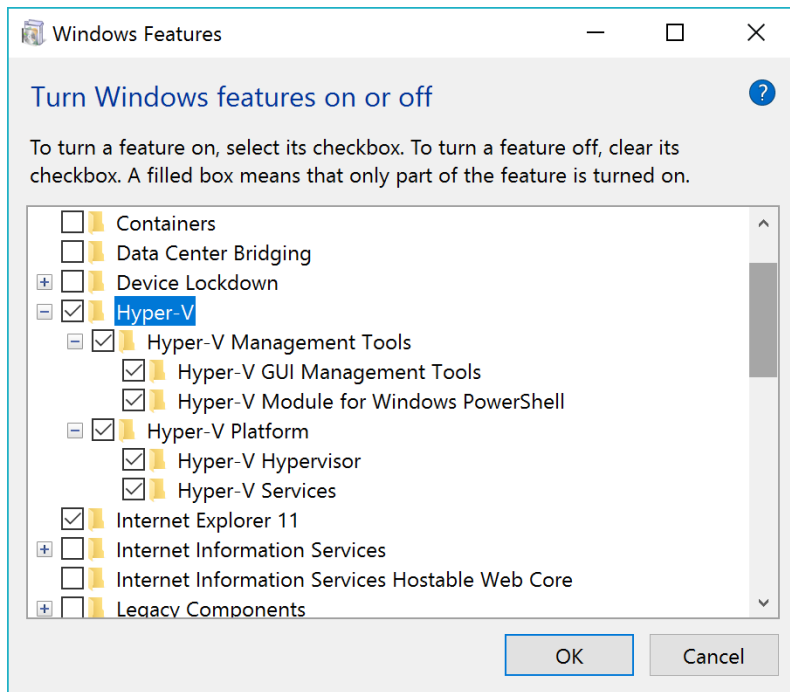
Hyper-V Architecture



Hyper-V Architecture



Enable the Hyper-V role through Settings

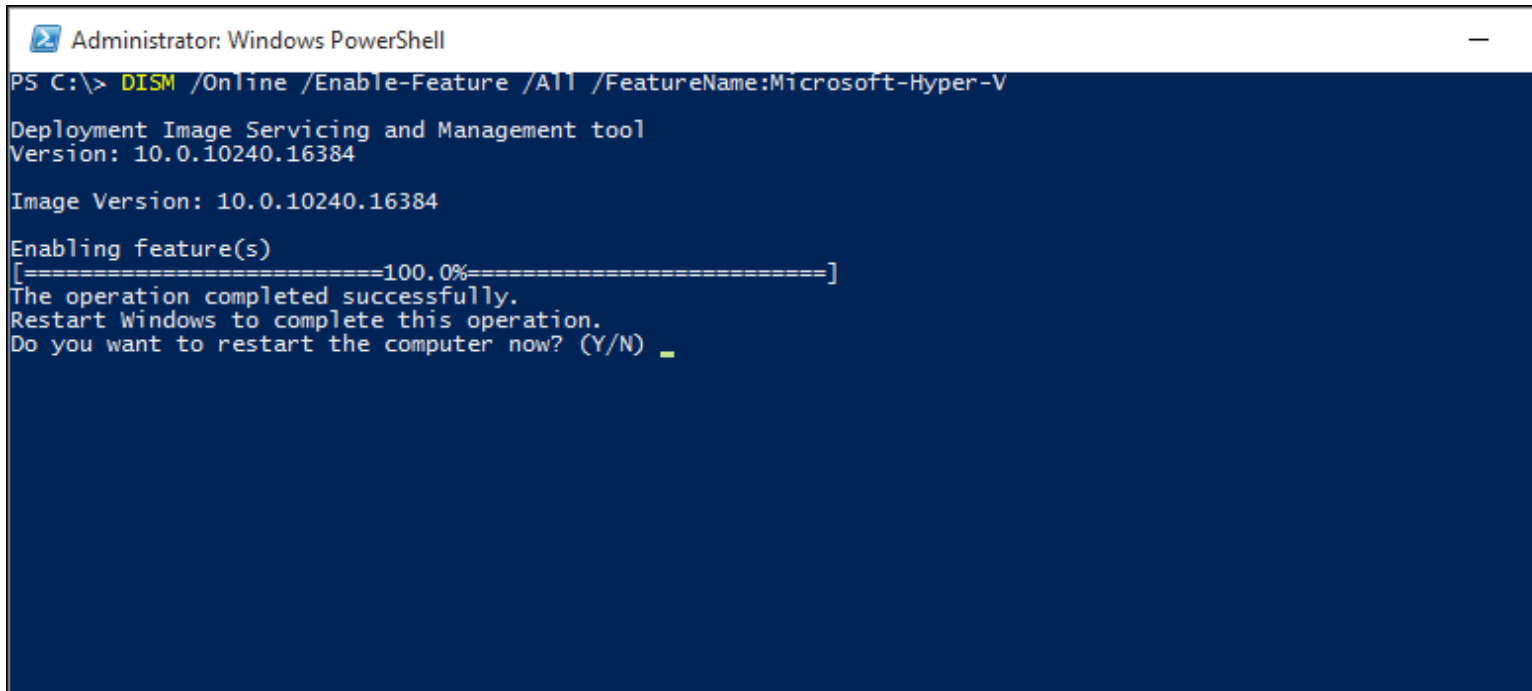


Enable Hyper-V using PowerShell

- Open a PowerShell console as Administrator.
- Run the following command:

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

Enable Hyper-V with CMD and DISM



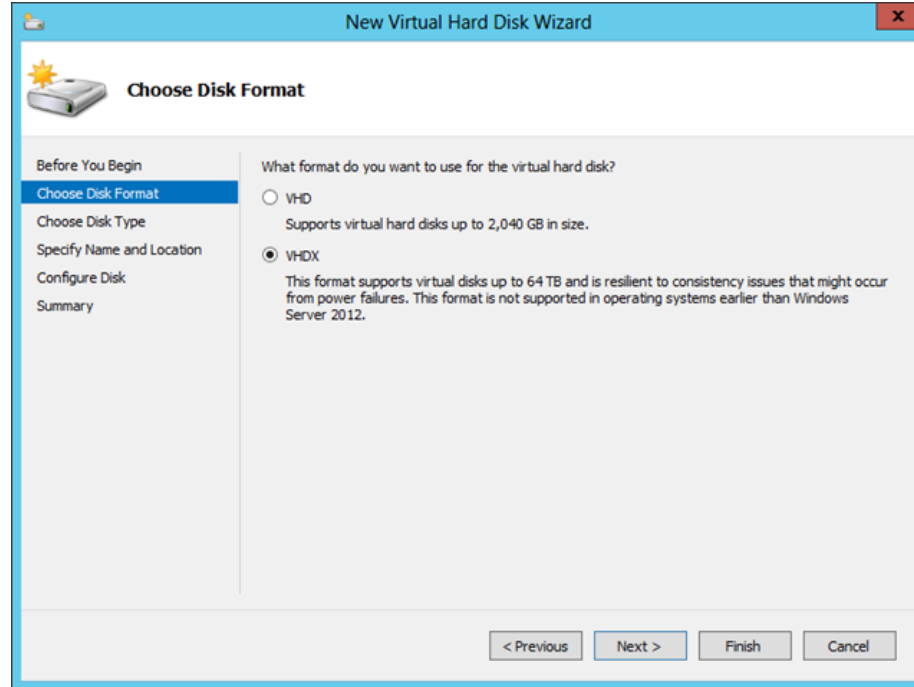
```
Administrator: Windows PowerShell
PS C:\> DISM /Online /Enable-Feature /All /FeatureName:Microsoft-Hyper-V

Deployment Image Servicing and Management tool
Version: 10.0.10240.16384

Image Version: 10.0.10240.16384

Enabling feature(s)
[=====100.0%=====]
The operation completed successfully.
Restart Windows to complete this operation.
Do you want to restart the computer now? (Y/N) _
```

VHDX or VHD



VHDX or VHD

VHD

- up to 2TB size

VHDX

- up to 64TB size
- better resiliency - protection against corruption during power outages
- online resizing - grow or shrink without shutting down the VM
- better performance

VHDX or VHD

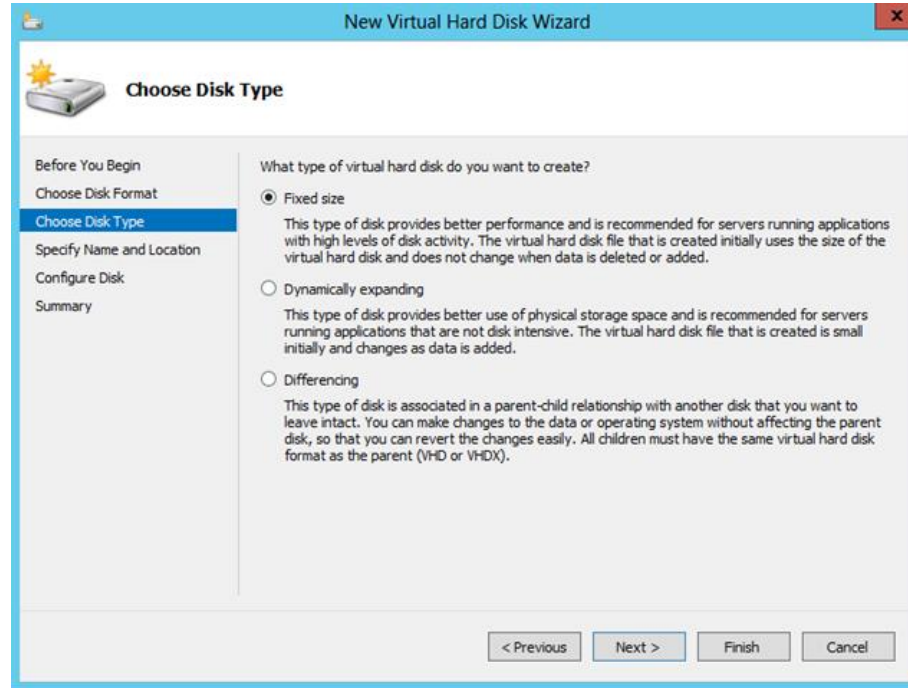
- convert VHD to VHDX
- convert VHDX to VHD

VHDX or VHD

What dependencies do Gen 1 or Gen 2 VMs

- Gen 1 VMs can use VHD or VHDX files
- Gen 2 VMs can only use VHDX files

Disk Types



Disk Types

Fixed-Size Virtual Hard Disk

Logical Hard Disk Size (16GB)

Physical VHD File Size (16GB)

Dynamically-Expanding Virtual Hard Disk

Logical Hard Disk Size (16GB)

Physical VHD File Size (4.5GB)

Based on amount of disk space used by the VM.

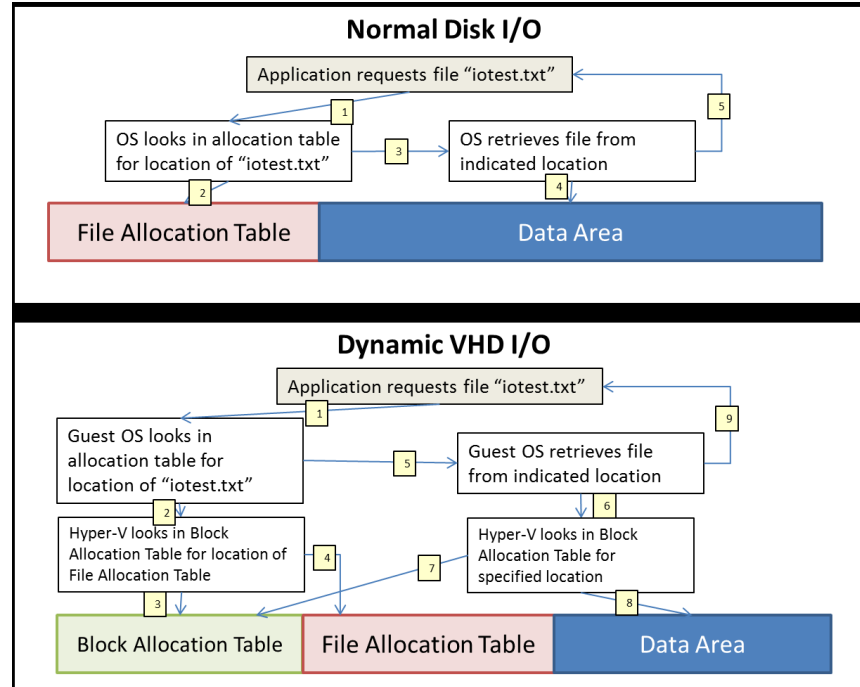
Linked Virtual Hard Disk

Linked Virtual Hard Disk

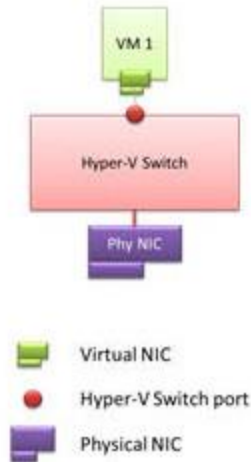
Logical Pointer to a physical hard disk.

Physical Hard Disk on Host Computer

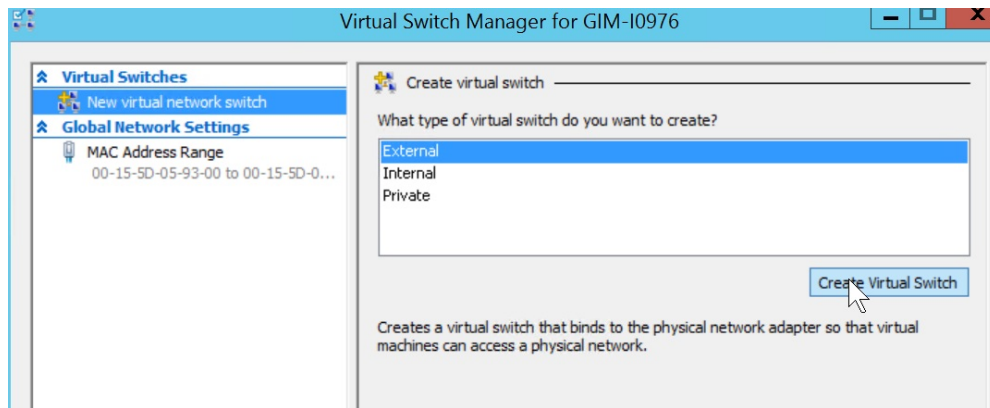
Disk Types



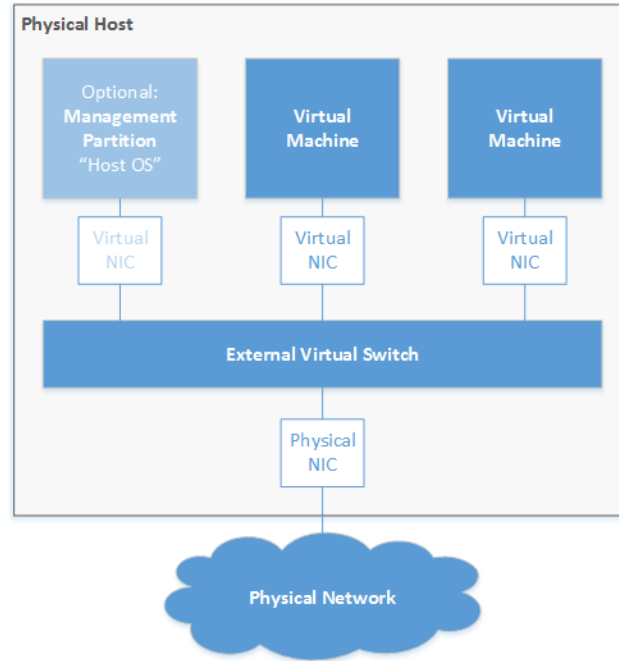
Hyper-V Virtual Switch



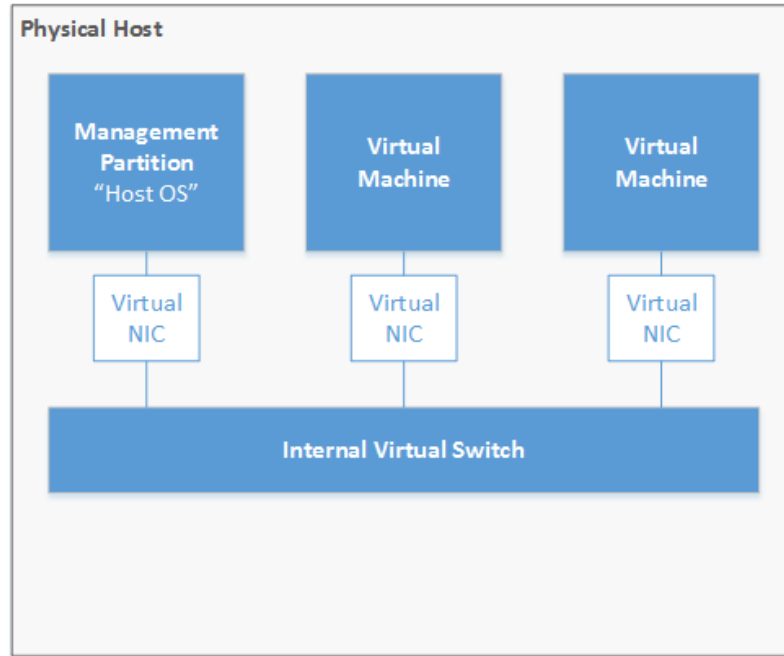
Hyper-V Virtual Switch



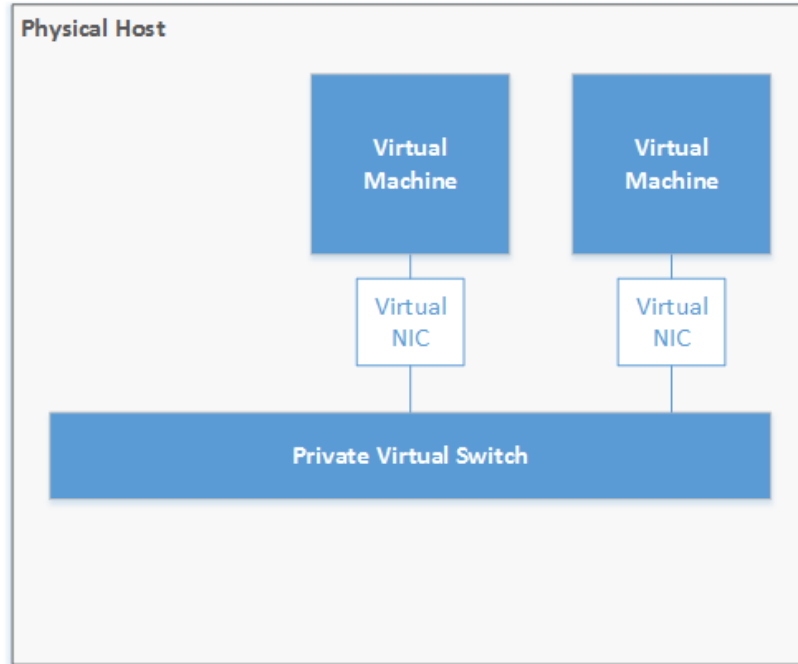
Hyper-V Virtual Switch



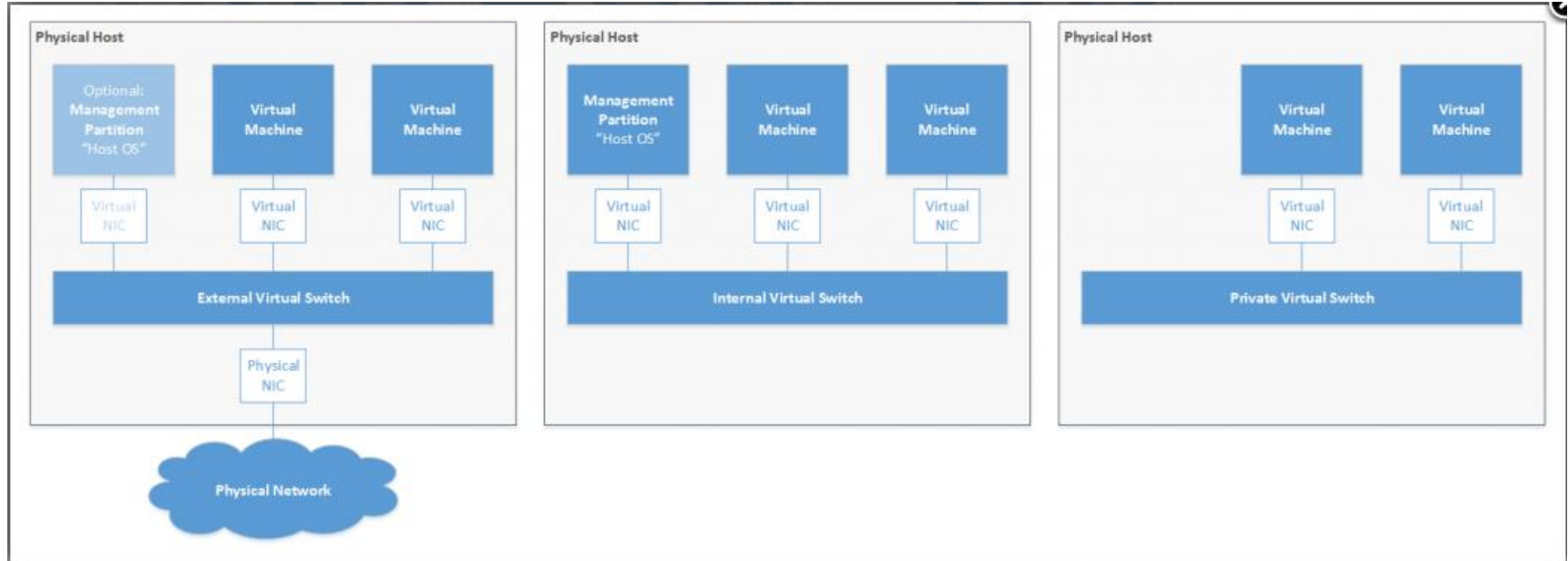
Hyper-V Virtual Switch



Hyper-V Virtual Switch



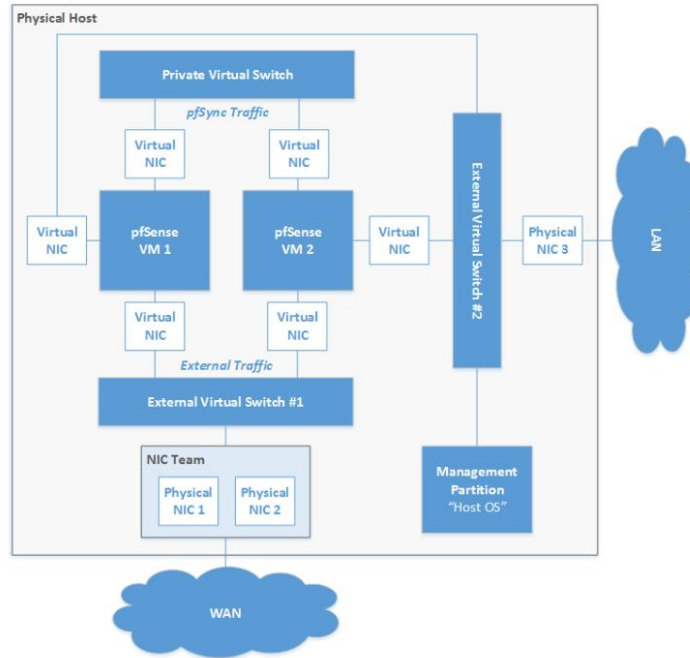
Hyper-V Virtual Switch



Hyper-V Virtual Switch

	External	Internal	Private
Management Partition Access ("Host OS")	Yes (optional)	Yes	No
Physical Uplink	Yes	No	No

Hyper-V Virtual Switch



Quick create

Create Virtual Machine

Select an operating system

 Windows 10 dev environment

 Ubuntu 18.04.1 LTS

 Local installation source



Windows 10 dev environment

Microsoft

Start building Universal Windows Platform apps quickly using a virtual machine.

This evaluation copy of Windows 10 1709 will enable you to try out Windows 10 UWP development with an evaluation copy of Windows.

This evaluation copy will expire after a pre-determined amount of time.

The license terms for the Windows 10 VMs supersede any conflicting Windows license terms.

See <https://aka.ms/windowsdevelopervirtualmachineeula> for any additional details.

Edition

Windows 10 Enterprise

Copyright

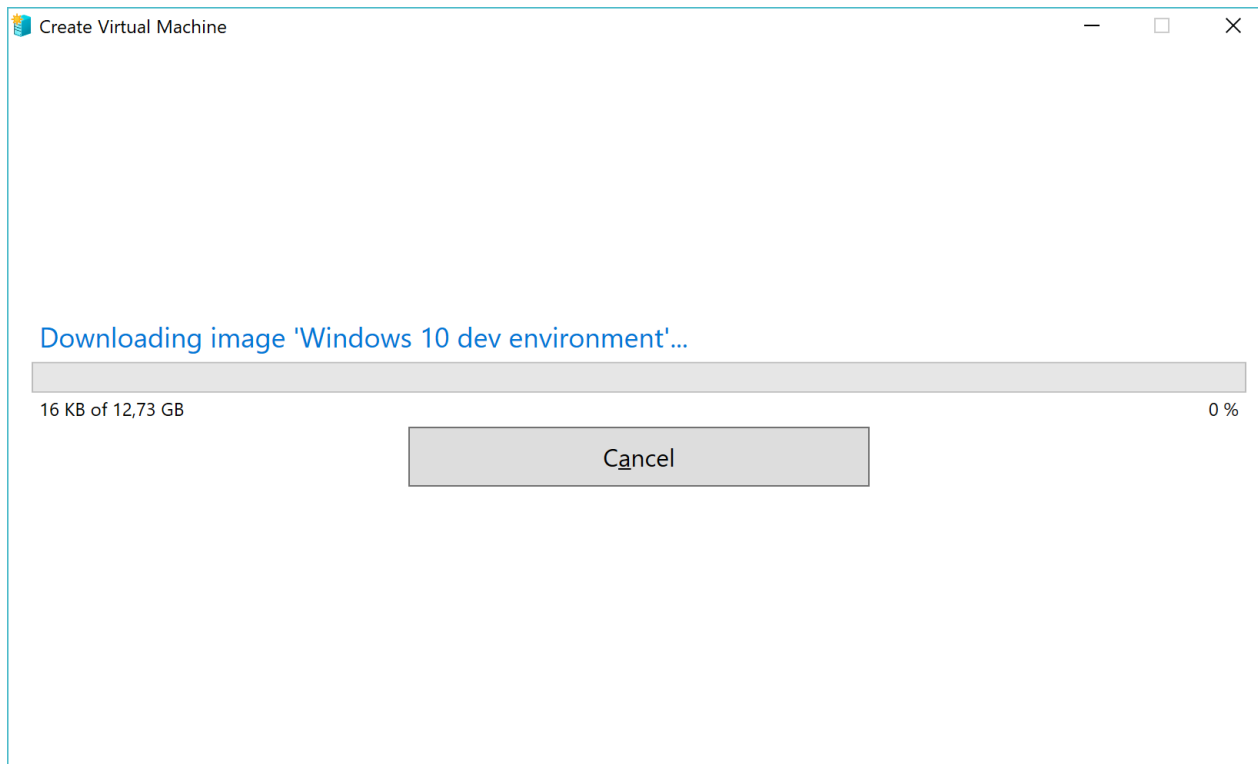
Copyright (c) Microsoft Corporation. All rights reserved.
License: Evaluation: <https://aka.ms/windowsdevelopervirtualmachineeula>

More options

Close

Create Virtual Machine





Create Virtual Machine

Select an operating system

Windows 10 dev environment

Local installation source

You can install from an ISO image file (.iso) or a virtual hard disk file (.vhd or .vhdx).

Windows1803.iso

C:\Users\danie\Downloads

Change installation source...

☐ This virtual machine will run Windows (enables Windows Secure Boot)

Name

Win1803

Network

Net_ext

Close

Create Virtual Machine

More options



Create Virtual Machine



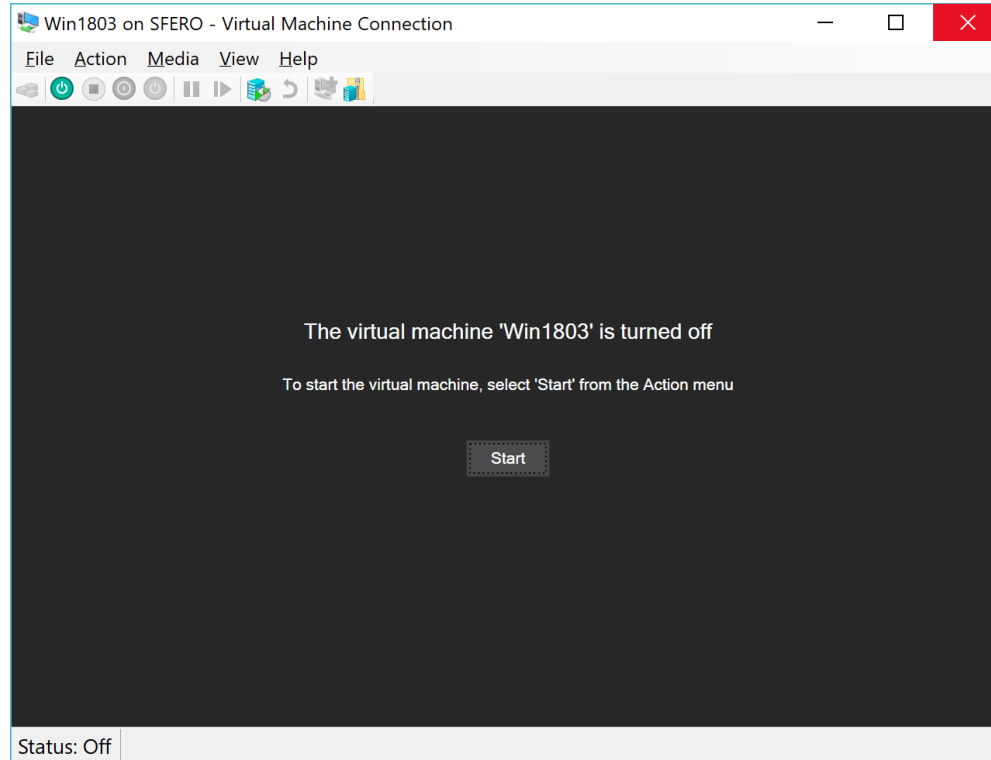
Virtual machine created successfully



Win1803

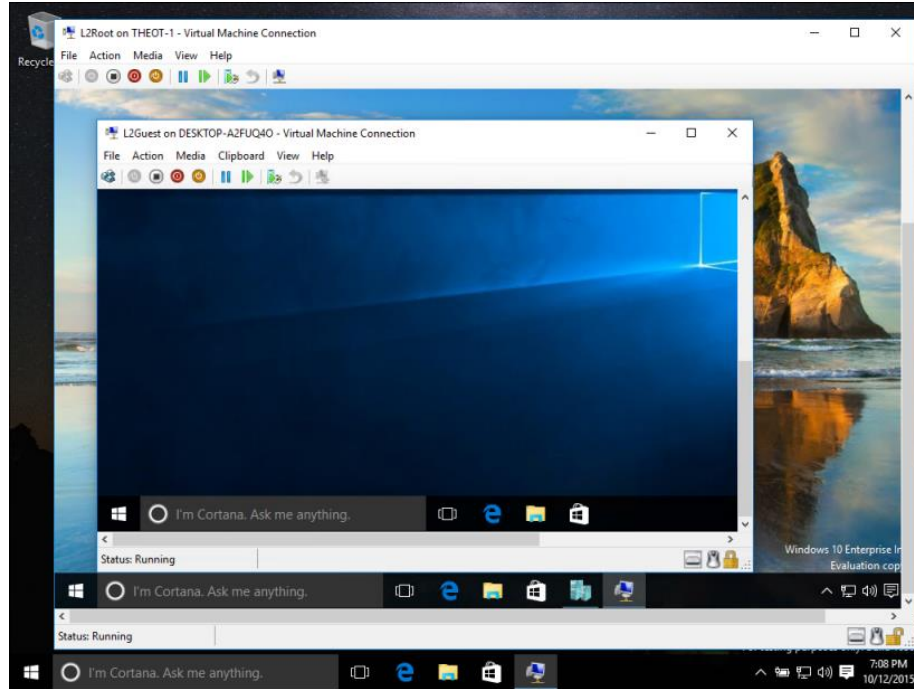
Connect

Edit settings...

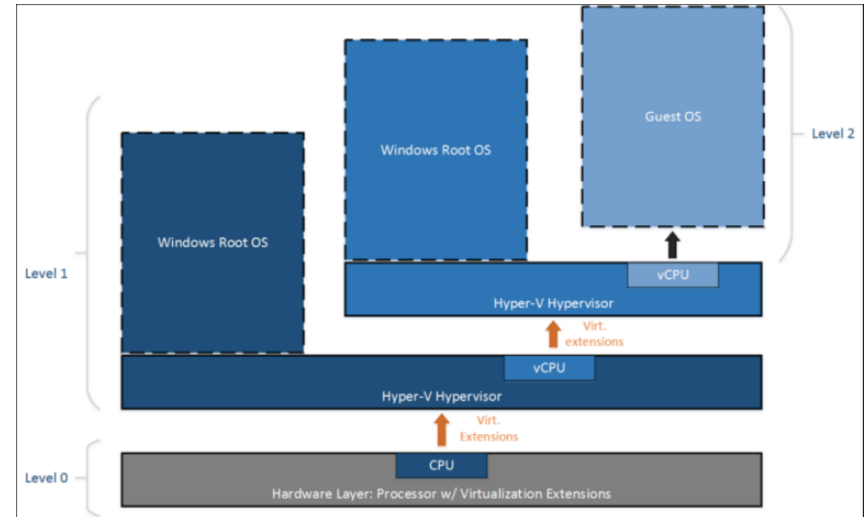
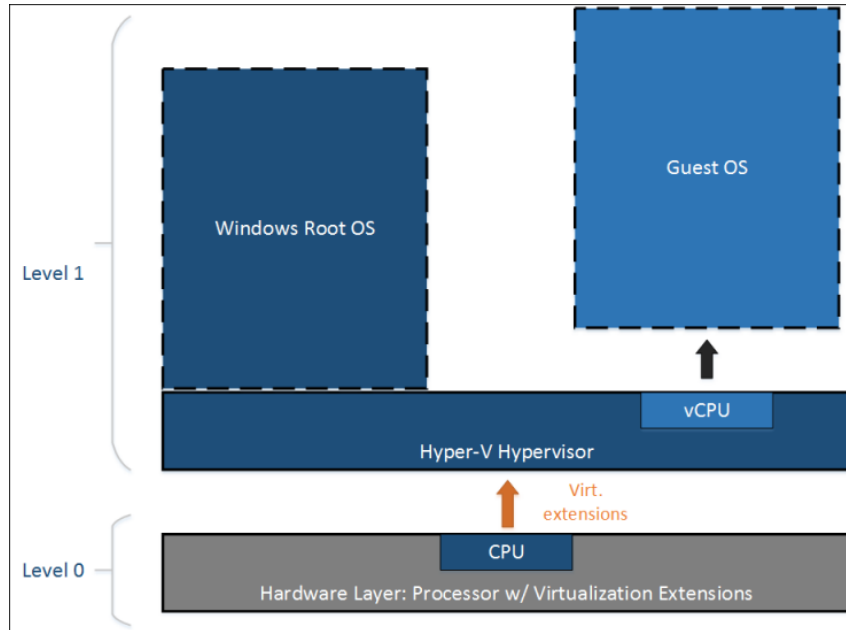


Nasted Virtualization

Nested Virtualization



Nested Virtualization



Nested Virtualization

- Enable Nested Virtualization

Set-VMProcessor -VMName <VMName> -ExposeVirtualizationExtensions \$true

- Disable Nested Virtualization

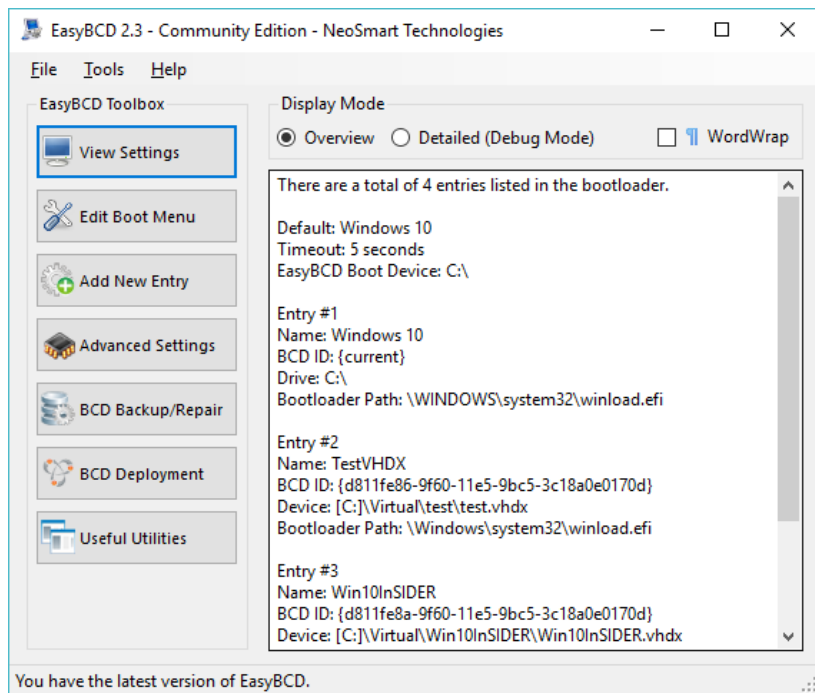
Set-VMProcessor -VMName <VMName> -ExposeVirtualizationExtensions \$false

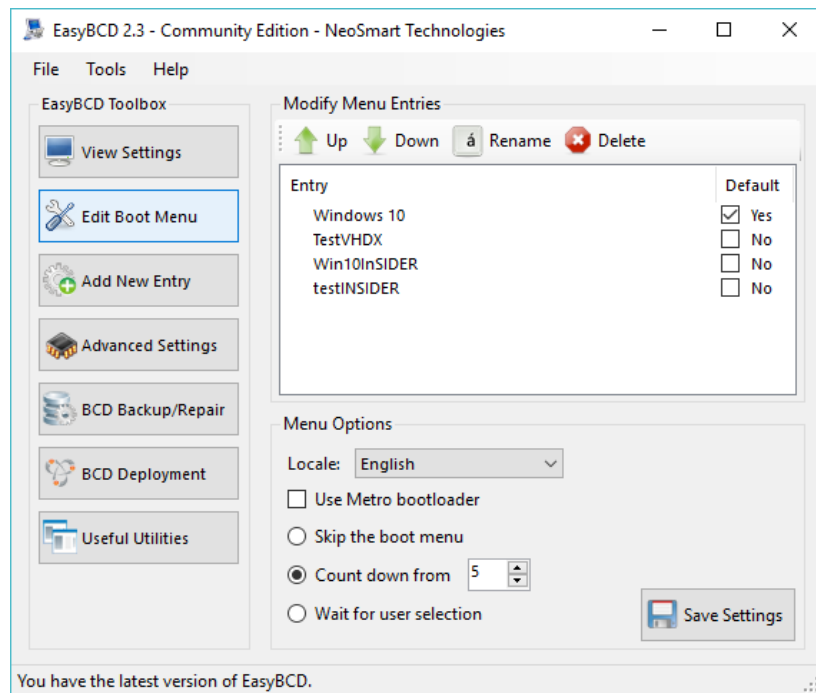
Nested Virtualization

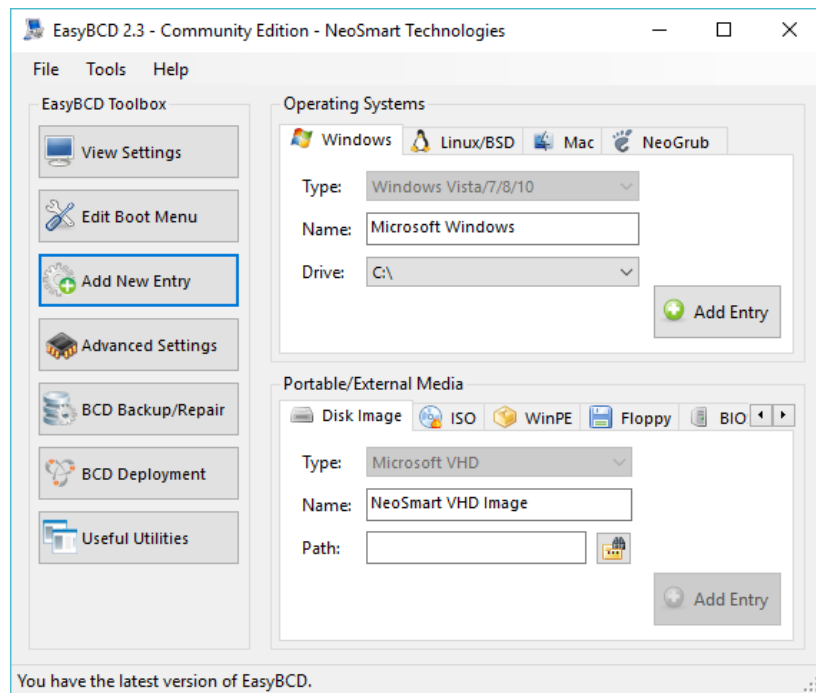
- Nested VM running Hyper-V must have dynamic memory disabled

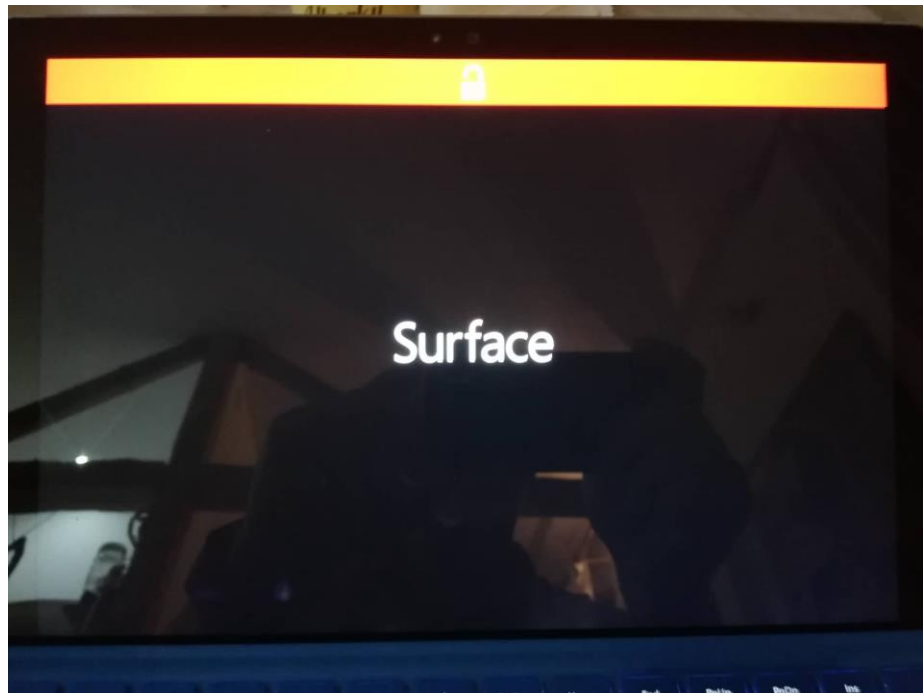
Boot OS from VHD of VHDX

EasyBCD









Choose an operating system to start, or press TAB to select a tool;
(Use the arrow keys to highlight your choice, then press ENTER.)

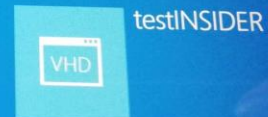
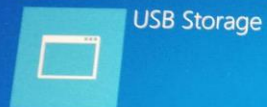
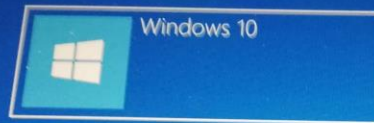
TESTING/REPAIR

To specify an advanced option for this choice, press F8.

Tools:

Windows Memory Diagnostic

Choose an operating system



Change defaults or choose other options

Priestor pre Vaše otázky

Ing. Daniel BAČA

daniel.baca@wug.sk

Ďakujem za pozornosť

Daniel BAČA

daniel.baca@wug.sk