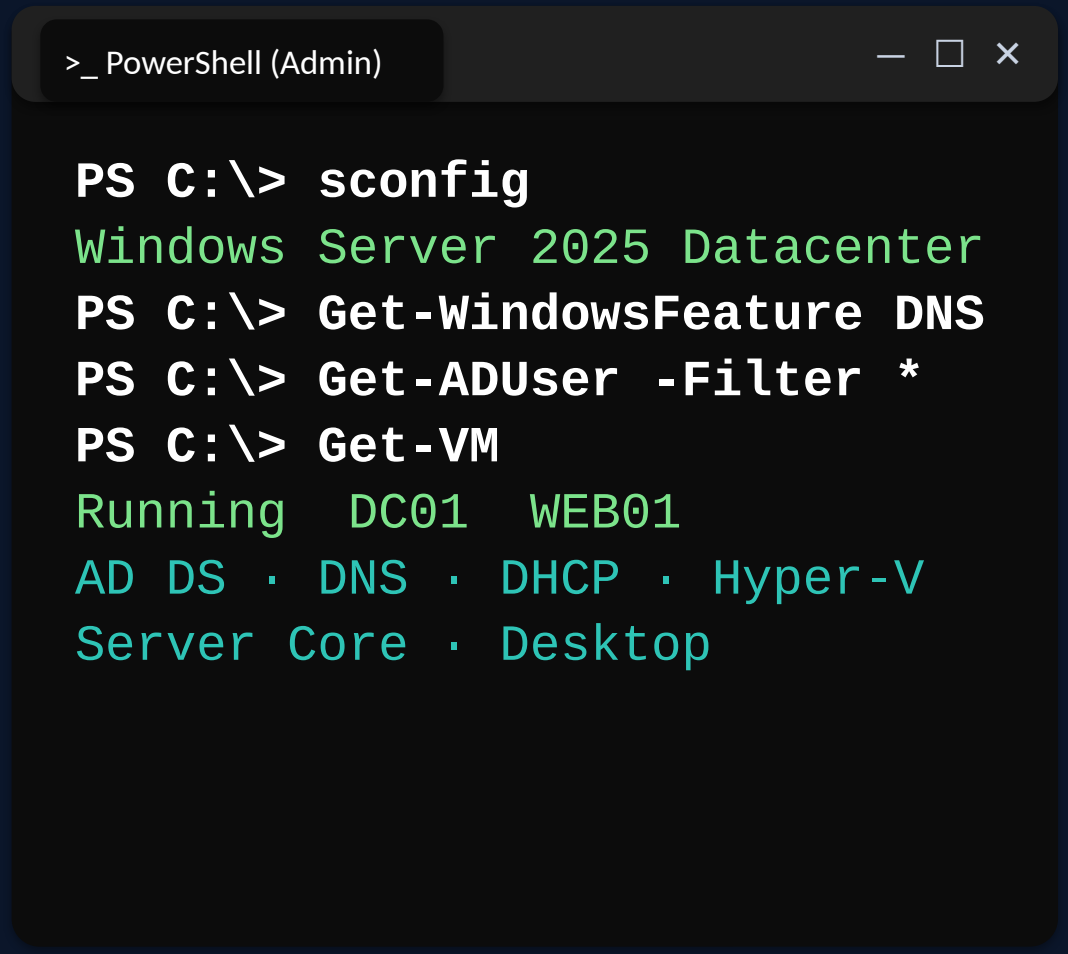


LESSON 9 OF 12

Windows Server 2025

Install · AD · Hyper-V · Admin

Hyper-V on Windows Server

Full Course · Windows Server 2025 (build 26100)

What You Will Learn in Lesson 9

- Hyper-V concepts: generations, VHDX disks, switches, dynamic memory
- What's new in Hyper-V on Windows Server 2025
- Installing Hyper-V (and nested virtualization for the lab)
- Virtual switches and creating VMs with PowerShell
- Templates with sysprep and differencing disks
- Checkpoints, export/import and PowerShell Direct
- Live migration, Hyper-V Replica and clustering

Hyper-V Concepts

Term	Meaning
Hypervisor (type 1)	Runs directly on hardware; Windows becomes the parent partition
Generation 2 VM	UEFI, Secure Boot, virtual TPM — use it for all modern guests
VHDX	Virtual disk: fixed, dynamically expanding, or differencing
Virtual switch	External (physical network), Internal (host + VMs), Private (VMs only)
Dynamic memory	Gives VMs memory as needed, between a minimum and maximum
Checkpoint	A point-in-time state of a VM — not a backup
Integration services	Drivers for time sync, shutdown, backup, file copy

Hyper-V in Windows Server 2025

Feature	Highlights
Scale	Up to 2,048 virtual CPUs and 240 TB of memory per generation 2 VM
GPU partitioning	Share one GPU among several VMs, with live migration and clustering
Workgroup clusters	Failover clusters without Active Directory (certificate-based)
Dynamic processor compatibility	Live-migrate between hosts with different CPU generations
Default	New VMs are generation 2 by default
Licensing reminder	Standard: 2 Windows Server VMs per licensed host; Datacenter: unlimited

Install Hyper-V (and Nested Virtualization for the Lab)

```
# LAB ONLY: SRV01 is itself a VM, so first allow nested virtualization
# On the physical host, with SRV01 turned off:
PS C:\> Stop-VM SRV01
PS C:\> Set-VMProcessor SRV01 -ExposeVirtualizationExtensions $true
PS C:\> Set-VMMemory SRV01 -DynamicMemoryEnabled $false -StartupBytes 8GB
PS C:\> Get-VMNetworkAdapter SRV01 | Set-VMNetworkAdapter -MacAddressSpoofing On
PS C:\> Start-VM SRV01

# On SRV01 (or any physical server):
PS C:\> Install-WindowsFeature Hyper-V -IncludeManagementTools -Restart
PS C:\> Get-VMHost | Select-Object Name, LogicalProcessorCount, MemoryCapacity, VirtualHardDiskPath
```

Virtual Switches and a New VM

```
PS C:\> New-VMSwitch -Name External -NetAdapterName Ethernet -AllowManagementOS $true
PS C:\> New-VMSwitch -Name Isolated -SwitchType Private
PS C:\> Get-VMSwitch

PS C:\> New-VM -Name WEB01 -Generation 2 -MemoryStartupBytes 2GB -SwitchName External `
           -NewVHDPath D:\VMs\WEB01.vhdx -NewVHDSizeBytes 60GB
PS C:\> Set-VMMemory WEB01 -DynamicMemoryEnabled $true -MinimumBytes 1GB -MaximumBytes 4GB
PS C:\> Set-VMProcessor WEB01 -Count 2
PS C:\> Add-VMDvdDrive WEB01 -Path D:\ISO\WindowsServer2025_Eval.iso
PS C:\> Set-VMFirmware WEB01 -FirstBootDevice (Get-VMDvdDrive WEB01)
PS C:\> Start-VM WEB01 ; vmconnect localhost WEB01
```

Templates: sysprep and Differencing Disks

```
# Inside a fully updated 'golden' VM:
C:\> C:\Windows\System32\Sysprep\sysprep.exe /generalize /oobe /shutdown

# On the host: keep the generalized disk as a read-only template
PS C:\> Move-Item D:\VMs\Golden.vhdx D:\Templates\WS2025-Base.vhdx
PS C:\> Set-ItemProperty D:\Templates\WS2025-Base.vhdx -Name IsReadOnly -Value $true

PS C:\> New-VHD -Path D:\VMs\APP01.vhdx -ParentPath D:\Templates\WS2025-Base.vhdx -Differencing
PS C:\> New-VM -Name APP01 -Generation 2 -MemoryStartupBytes 2GB -VHDPath D:\VMs\APP01.vhdx `
            -SwitchName External ; Start-VM APP01        # ready in about a minute
```

Checkpoints, Export and PowerShell Direct

```
PS C:\> Checkpoint-VM WEB01 -SnapshotName 'Before IIS'
PS C:\> Get-VMSnapshot WEB01
PS C:\> Restore-VMSnapshot -VMName WEB01 -Name 'Before IIS' -Confirm:$false
PS C:\> Remove-VMSnapshot -VMName WEB01 -Name 'Before IIS'      # merge when done

PS C:\> Export-VM WEB01 -Path E:\Exports ; Import-VM -Path (Get-Item E:\Exports\WEB01\*\*.vmcx) -Copy
-GenerateNewId

# PowerShell Direct: manage a VM from its host, even with no network
PS C:\> Enter-PSSession -VMName WEB01 -Credential (Get-Credential)
PS C:\> Invoke-Command -VMName WEB01 -Credential $c -ScriptBlock { Get-NetIPAddress -AddressFamily
IPv4 }
PS C:\> Copy-VMFile WEB01 -SourcePath C:\Scripts\setup.ps1 -DestinationPath C:\Temp\setup.ps1 -
FileSource Host -CreateFullPath
```

High Availability for VMs

Feature	What it does
Live migration	Move a running VM to another host with no downtime
Storage migration	Move a running VM's disks to new storage
Hyper-V Replica	Asynchronous copy of a VM to another host or site, for disaster recovery
Failover clustering	VMs restart automatically on another node when a host fails
Storage Spaces Direct	Datacenter: hyper-converged storage for the cluster
Backup	Use Hyper-V-aware backup (Lesson 11), not checkpoints

Live Migration, Replica and Monitoring

```
# Between two domain-joined Hyper-V hosts (HV01, HV02):
PS C:\> Enable-VMMigration ; Set-VMHost -VirtualMachineMigrationAuthenticationType Kerberos
PS C:\> Move-VM WEB01 -DestinationHost HV02 -IncludeStorage -DestinationStoragePath D:\VMs\WEB01

PS C:\> Enable-VMReplication WEB01 -ReplicaServerName HV02 -ReplicaServerPort 80 `
           -AuthenticationType Kerberos ; Start-VMInitialReplication WEB01

PS C:\> Get-VM | Select-Object Name, State, CPUUsage, @{n='MemGB';e={$_.MemoryAssigned/1GB}}, Uptime
PS C:\> Enable-VMResourceMetering WEB01 ; Measure-VM WEB01
```

Summary & Homework

- Generation 2 VMs, VHDX disks, the right switch type, dynamic memory
- Install-WindowsFeature Hyper-V; nested virtualization for labs
- New-VM, Set-VMMemory, Set-VMProcessor, Start-VM, vmconnect
- sysprep + templates; checkpoints are not backups
- PowerShell Direct: Enter-PSSession -VMName
- Homework: build WEB01 on SRV01 and take a checkpoint before Lesson 10

Thank You! 🙏

Free videos & PDFs: www.MyWebUniversity.com

Slides for this lesson: MyWebUniversity.com/presentations

YouTube: @MyWebUniversity · @MyWebUniversity-Dari

Wahidullah Lutfy — Founder and Director of IT of MyWebUniversity, and CS teacher

Book: The Direct Path to Linux Ubuntu (Amazon · Barnes & Noble)

Learn it, then pass it on.