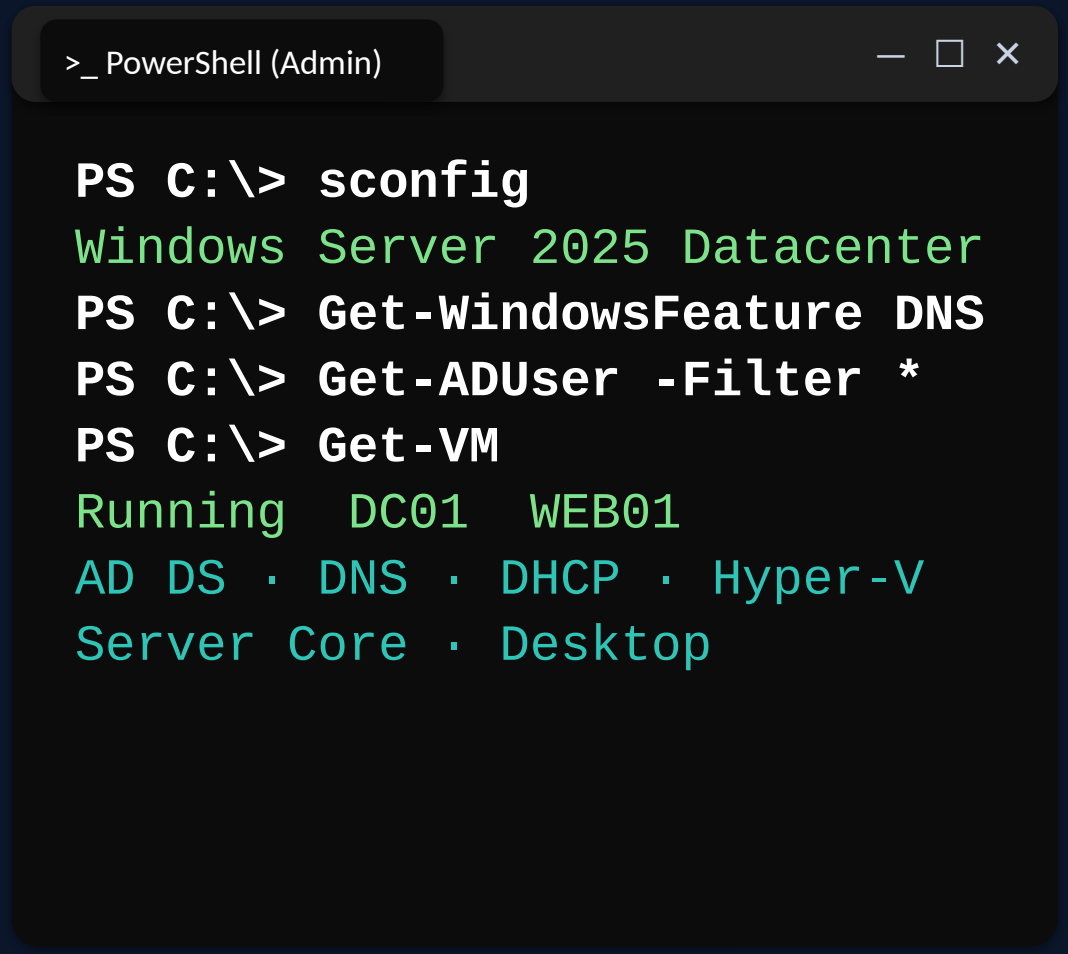


LESSON 7 OF 12

Windows Server 2025

Install · AD · Hyper-V · Admin

DNS and DHCP Servers

Full Course · Windows Server 2025 (build 26100)

What You Will Learn in Lesson 7

- DNS concepts: zones, records, forwarders and AD-integrated DNS
- Managing DNS with PowerShell: zones, A, PTR, CNAME records
- Troubleshooting name resolution
- Securing DNS
- DHCP concepts: DORA, scopes, options, reservations
- Installing, authorizing and configuring DHCP
- DHCP failover and troubleshooting

DNS Concepts

Term	Meaning
Forward lookup zone	Name → IP, e.g. lab.mywebuniversity.local
Reverse lookup zone	IP → name, e.g. 0.0.10.in-addr.arpa
AD-integrated zone	Stored in AD; replicated to DCs; secure dynamic updates
Records	A / AAAA (IP), CNAME (alias), MX (mail), PTR (reverse), SRV (services), TXT
Forwarders	Where the server sends internet queries it cannot answer
Conditional forwarder	Send one domain's queries to a specific server (partner company)
Scavenging	Removes stale dynamic records automatically

Manage DNS with PowerShell

```
PS C:\> Get-DnsServerZone -ComputerName DC01
PS C:\> Add-DnsServerPrimaryZone -NetworkId 10.0.0.0/24 -ReplicationScope Domain   # reverse zone
PS C:\> Add-DnsServerResourceRecordA -ZoneName lab.mywebuniversity.local -Name web `
           -IPv4Address 10.0.0.20 -CreatePtr
PS C:\> Add-DnsServerResourceRecordCName -ZoneName lab.mywebuniversity.local `
           -Name intranet -HostNameAlias srv01.lab.mywebuniversity.local
PS C:\> Set-DnsServerForwarder -IPAddress 1.1.1.1, 8.8.8.8
PS C:\> Get-DnsServerResourceRecord -ZoneName lab.mywebuniversity.local -RRType A
PS C:\> Set-DnsServerScavenging -ScavengingState $true -ScavengingInterval 7.00:00:00 -
ApplyOnAllZones
```

Troubleshooting Name Resolution

```
PS C:\> Resolve-DnsName srv01.lab.mywebuniversity.local
PS C:\> Resolve-DnsName srv01 -Server 10.0.0.10 -DnsOnly       # ask DC01 directly
PS C:\> Resolve-DnsName 10.0.0.20                              # reverse (PTR)
C:\> nslookup -type=SRV _ldap._tcp.dc._msdcs.lab.mywebuniversity.local

C:\> ipconfig /flushdns & ipconfig /registerdns     # client: clear cache, re-register
PS C:\> Clear-DnsServerCache -ComputerName DC01 -Force
C:\> dcdiag /test:dns /v                            # AD-specific DNS tests
# Golden rule: domain members use ONLY your DCs as DNS servers
```

Securing DNS

Practice	Why
Secure dynamic updates only	Only domain members can register records
Do not be an open resolver	Never answer recursive queries from the internet
Scavenging on	Stale records cause wrong answers and confusion
DNSSEC (where needed)	Signs zones so answers cannot be forged
Logging	Enable analytical/audit logs to investigate problems
Limit zone transfers	Only to listed secondary servers

DHCP Concepts

Term	Meaning
DORA	Discover, Offer, Request, Acknowledge — how a client gets an address
Scope	A range of addresses for one subnet, e.g. 10.0.0.100-200
Exclusions	Addresses in the range that DHCP must not hand out
Reservations	Always give the same IP to one device (by MAC address)
Options	003 router, 006 DNS servers, 015 DNS domain name
Lease	How long a client may keep its address (default 8 days)
Authorization	In a domain, a DHCP server must be authorized in AD to run

Install, Authorize and Configure DHCP

```
PS C:\> Install-WindowsFeature DHCP -IncludeManagementTools -ComputerName DC01
PS C:\> Invoke-Command DC01 { netsh dhcp add securitygroups ; Restart-Service DHCPServer }
PS C:\> Add-DhcpServerInDC -DnsName dc01.lab.mywebuniversity.local -IPAddress 10.0.0.10

PS C:\> Add-DhcpServerv4Scope -ComputerName DC01 -Name LabNet -StartRange 10.0.0.100 `
            -EndRange 10.0.0.200 -SubnetMask 255.255.255.0 -LeaseDuration 1.00:00:00
PS C:\> Add-DhcpServerv4ExclusionRange -ComputerName DC01 -ScopeId 10.0.0.0 `
            -StartRange 10.0.0.100 -EndRange 10.0.0.109
PS C:\> Set-DhcpServerv4OptionValue -ComputerName DC01 -ScopeId 10.0.0.0 `
            -DnsServer 10.0.0.10 -DnsDomain lab.mywebuniversity.local -Router 10.0.0.1
PS C:\> Add-DhcpServerv4Reservation -ComputerName DC01 -ScopeId 10.0.0.0 `
            -IPAddress 10.0.0.150 -ClientId '00-15-5D-01-02-03' -Name Printer01
```

Test with the Client, and Watch the Leases

```
# On CL01: switch the adapter to automatic (DHCP)
PS C:\> Set-NetIPInterface -InterfaceAlias Ethernet -Dhcp Enabled
PS C:\> Set-DnsClientServerAddress -InterfaceAlias Ethernet -ResetServerAddresses
C:\> ipconfig /release & ipconfig /renew & ipconfig /all

# On the server:
PS C:\> Get-DhcpServerv4Lease -ComputerName DC01 -ScopeId 10.0.0.0
PS C:\> Get-DhcpServerv4ScopeStatistics -ComputerName DC01      # free / in use / %
PS C:\> Get-DhcpServerv4OptionValue -ComputerName DC01 -ScopeId 10.0.0.0
```

DHCP Failover for High Availability

```
# Requires a second DHCP server, e.g. DC02 (authorized in AD)
PS C:\> Add-DhcpServerv4Failover -ComputerName DC01 -Name LabFailover `
          -PartnerServer dc02.lab.mywebuniversity.local -ScopeId 10.0.0.0 `
          -LoadBalancePercent 50 -SharedSecret (Read-Host 'Shared secret') -AutoStateTransition
$true
PS C:\> Get-DhcpServerv4Failover -ComputerName DC01

# Modes: Load balance (both answer) or Hot standby (partner waits)
# Backup: Backup-DhcpServer -ComputerName DC01 -Path C:\DhcpBackup
#         Export-DhcpServer -ComputerName DC01 -File C:\DhcpBackup\dhcp.xml -Leases
```

Troubleshooting DHCP

Symptom	Likely cause and fix
Client has 169.254.x.x	No DHCP answer: server down, not authorized, scope full, network/VLAN
Server will not hand out	Not authorized in AD (Add-DhcpServerInDC); service stopped
Wrong DNS or router	Check scope/server options; renew the client
Clients on another subnet	Router needs a DHCP relay (IP helper) pointing to the server
Address conflicts	Static IP inside the scope — exclude it, or set conflict detection
Unknown DHCP server	Rogue router or device on the network — find and remove it

Summary & Homework

- AD-integrated zones, secure dynamic updates, forwarders, scavenging
- Add-DnsServerResourceRecordA -CreatePtr; Resolve-DnsName -Server
- Domain members use only your DCs for DNS
- DHCP: authorize, scope, exclusions, options 003/006/015, reservations
- Homework: create the reverse zone, web A record and intranet CNAME
- Homework: build the LabNet DHCP scope and get CL01 an address

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.