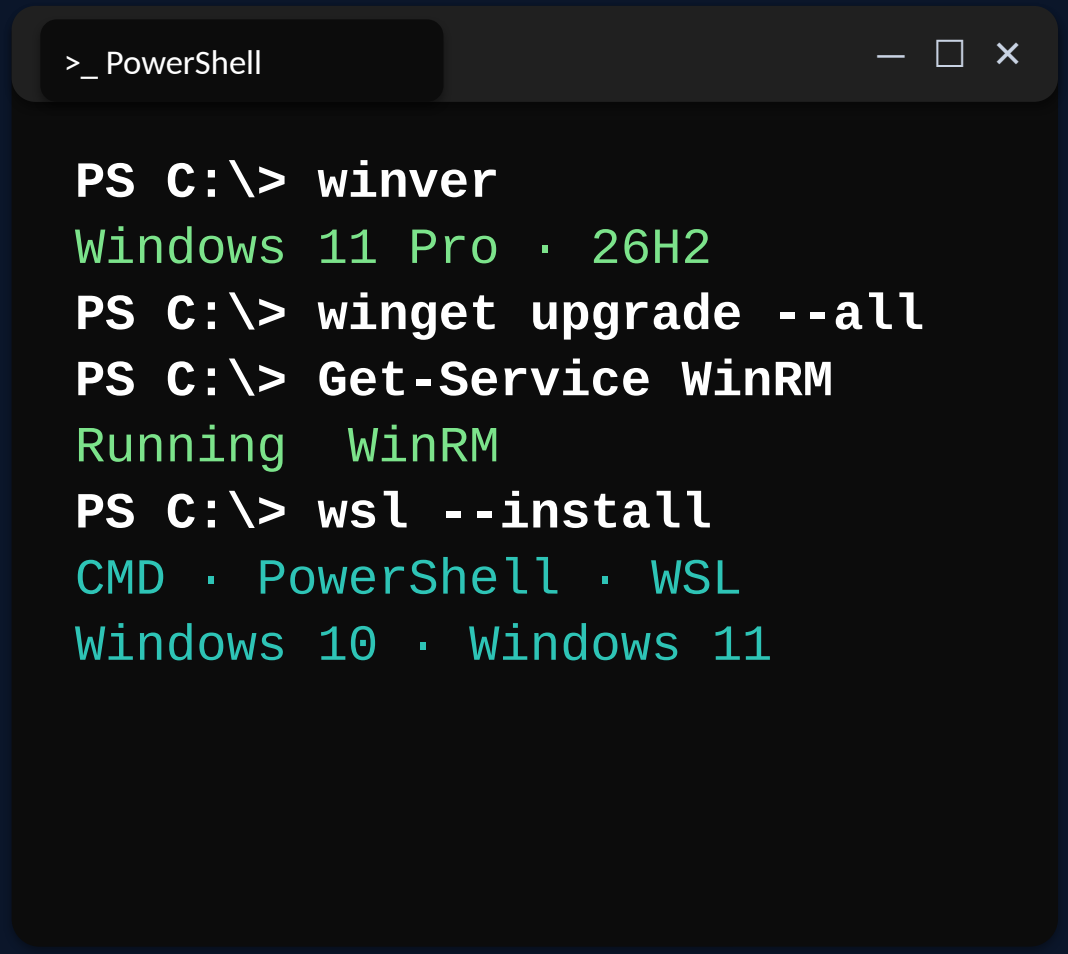


LESSON 10 OF 12

Windows 10 & 11

Desktop · Workstation · Laptop

Networking, Firewall, Remote Desktop & SSH

Full Course · Windows 11 26H2 · Windows 10 22H2

What You Will Learn in Lesson 10

- Network basics: IP, subnet, gateway, DNS, DHCP and network profiles
- Reading the configuration: ipconfig and Get-NetIPConfiguration
- Troubleshooting step by step: ping, tracert, nslookup, Test-NetConnection
- Static IP, DNS servers and Wi-Fi on laptops
- Microsoft Defender Firewall: profiles and rules
- Remote Desktop and the OpenSSH server
- File sharing with SMB

Network Basics in One Slide

Term	Meaning	Example
IP address	This computer's address on the network	192.168.1.25 / fe80::1c2b…
Subnet / prefix	Which addresses are local	255.255.255.0 = /24
Default gateway	The router that leads to other networks	192.168.1.1
DNS server	Turns names into IP addresses	Router, 1.1.1.1, 8.8.8.8
DHCP	Hands out addresses automatically	Most home and office networks
Network profile	Public (strict) or Private (trusted)	Cafe = Public, home = Private

Read the Network Configuration

```
C:\> ipconfig                          # IP, mask, gateway per adapter
C:\> ipconfig /all                     # + MAC, DHCP server, DNS servers, lease
C:\> ipconfig /release & ipconfig /renew   # ask DHCP for a new address
C:\> ipconfig /flushdns                # clear the DNS cache

PS C:\> Get-NetAdapter | Select-Object Name, Status, LinkSpeed, MacAddress
PS C:\> Get-NetIPConfiguration
PS C:\> Get-NetIPAddress -AddressFamily IPv4 | Select-Object InterfaceAlias, IPAddress, PrefixLength
```

Troubleshoot Step by Step

```
PS C:\> ping 127.0.0.1                    # 1. is TCP/IP working on this PC?
PS C:\> ping 192.168.1.1                  # 2. can I reach my gateway (router)?
PS C:\> ping 1.1.1.1                      # 3. can I reach the internet by IP?
PS C:\> Resolve-DnsName microsoft.com  # 4. does DNS work?  (CMD: nslookup)
PS C:\> Test-NetConnection microsoft.com -Port 443   # 5. can I reach the service?
PS C:\> tracert microsoft.com             # where does the path stop?
PS C:\> Get-NetTCPConnection -State Listen | Sort-Object LocalPort |
            Select-Object LocalPort, OwningProcess        # (CMD: netstat -ano)
```

Static IP and DNS Servers

```
# Run as Administrator. Check your adapter name first: Get-NetAdapter
PS C:\> New-NetIPAddress -InterfaceAlias Ethernet -IPAddress 192.168.1.50 `
           -PrefixLength 24 -DefaultGateway 192.168.1.1
PS C:\> Set-DnsClientServerAddress -InterfaceAlias Ethernet -ServerAddresses 1.1.1.1, 8.8.8.8

# Back to automatic (DHCP):
PS C:\> Remove-NetIPAddress -InterfaceAlias Ethernet -AddressFamily IPv4 -Confirm:$false
PS C:\> Set-NetIPInterface -InterfaceAlias Ethernet -Dhcp Enabled
PS C:\> Set-DnsClientServerAddress -InterfaceAlias Ethernet -ResetServerAddresses
# GUI: Settings > Network & internet > Ethernet/Wi-Fi > IP assignment > Edit
```

Wi-Fi and Laptops

Task	How
Current Wi-Fi details	netsh wlan show interfaces (signal, band, speed)
Saved networks	netsh wlan show profiles
Wi-Fi health report	netsh wlan show wlanreport (HTML report)
Metered connection	Settings > Network > Wi-Fi > network > Metered (saves data)
Mobile hotspot	Settings > Network & internet > Mobile hotspot
VPN	Settings > Network & internet > VPN, or your company's VPN app

Microsoft Defender Firewall

Idea	What it means
Profiles	Domain, Private, Public — each with its own rules
Default	Inbound connections blocked; outbound allowed
Rules	Allow or block by program, port, protocol, address
Console	wf.msc: Windows Defender Firewall with Advanced Security
Golden rule	Open only what you need, only on the profile you need
Never	Turn the firewall off to 'fix' a problem — add a rule instead

Firewall with PowerShell

```
PS C:\> Get-NetFirewallProfile | Select-Object Name, Enabled, DefaultInboundAction
PS C:\> Get-NetConnectionProfile | Select-Object Name, NetworkCategory
PS C:\> Set-NetConnectionProfile -InterfaceAlias Ethernet -NetworkCategory Private

PS C:\> New-NetFirewallRule -DisplayName 'Lab Web 8080' -Direction Inbound `
           -Protocol TCP -LocalPort 8080 -Action Allow -Profile Private
PS C:\> Get-NetFirewallRule -DisplayName 'Lab*' | Select-Object DisplayName, Enabled, Profile
PS C:\> Remove-NetFirewallRule -DisplayName 'Lab Web 8080'
```

Remote Desktop (RDP)

```
# The computer you connect TO must run Pro, Enterprise or Education
# GUI: Settings > System > Remote Desktop > On  (keep NLA required)
PS C:\> Set-ItemProperty 'HKLM:\System\CurrentControlSet\Control\Terminal Server' `
           -Name fDenyTSConnections -Value 0
PS C:\> Enable-NetFirewallRule -DisplayGroup 'Remote Desktop'
PS C:\> Add-LocalGroupMember 'Remote Desktop Users' -Member student

C:\> mstsc /v:PC01                          # connect (or use the Windows App)
# Port 3389: NEVER expose it to the internet — use a VPN or a gateway
```

OpenSSH: Client and Server

```
PS C:\> ssh admin@192.168.1.10           # the client is built in
PS C:\> scp .\report.pdf admin@server:/tmp/

# Install and start the SSH server (Administrator)
PS C:\> Add-WindowsCapability -Online -Name OpenSSH.Server~~~~0.0.1.0
PS C:\> Start-Service sshd ; Set-Service sshd -StartupType Automatic
PS C:\> Get-NetFirewallRule -Name *OpenSSH* | Select-Object Name, Enabled

# From another computer:  ssh student@PC01   -> a Windows command prompt over SSH
# Keys: C:\Users\<you>\.ssh\authorized_keys  (admins: C:\ProgramData\ssh\
administrators_authorized_keys)
```

Share Files with SMB

```
# Run as Administrator; network profile should be Private
PS C:\> New-SmbShare -Name Lab -Path C:\Lab -ReadAccess Everyone `
           -FullAccess "$env:COMPUTERNAME\student"
PS C:\> Get-SmbShare
PS C:\> Get-SmbSession                      # who is connected now?

C:\> net use Z: \\PC01\Lab /persistent:yes   # map a drive on another PC
PS C:\> New-PSDrive -Name L -PSProvider FileSystem -Root \\PC01\Lab -Persist
PS C:\> Remove-SmbShare -Name Lab
```

Summary & Homework

- ipconfig /all and Get-NetIPConfiguration show the full picture
- Troubleshoot in order: 127.0.0.1 → gateway → internet IP → DNS → port
- Firewall: precise rules, right profile; never turn it off
- RDP needs Pro on the host; never expose 3389 to the internet
- Homework: turn on the OpenSSH server in your VM and connect to it
- Homework: create, use and remove an SMB share between two VMs

Thank You! 🙏

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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.