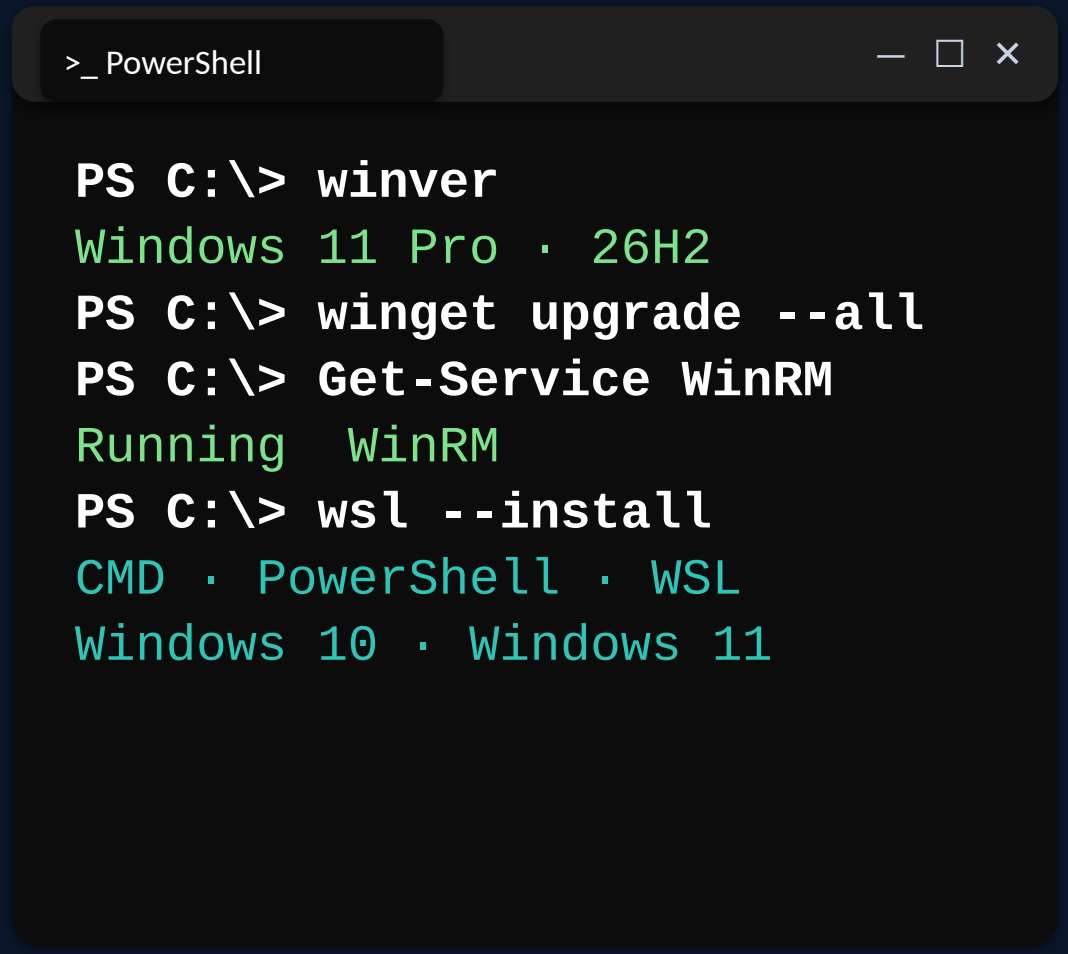


LESSON 11 OF 12

Windows 10 & 11

Desktop · Workstation · Laptop

Storage, Security, Updates & Backup

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

What You Will Learn in Lesson 11

- Disks, partitions and volumes in the GUI and PowerShell
- NTFS permissions with icacls and Get-Acl
- BitLocker and device encryption — and the recovery key
- Windows Security: Defender Antivirus, SmartScreen, memory integrity
- Managing Windows Update like an administrator
- Backups: the 3-2-1 rule, File History, Windows Backup, restore points
- A lab that protects a real folder end to end

Disks and Volumes with PowerShell

```
PS C:\> Get-PhysicalDisk | Select-Object FriendlyName, MediaType, HealthStatus,
           @{n='GB'; e={[int]($_.Size/1GB)}}
PS C:\> Get-Disk ; Get-Partition ; Get-Volume

# Prepare a NEW empty disk (check the number twice!)
PS C:\> Initialize-Disk -Number 1 -PartitionStyle GPT
PS C:\> New-Partition -DiskNumber 1 -UseMaximumSize -AssignDriveLetter |
           Format-Volume -FileSystem NTFS -NewFileSystemLabel Data

PS C:\> Optimize-Volume -DriveLetter C -ReTrim -Verbose    # SSD TRIM
```

GUI: diskmgmt.msc, or Settings > System > Storage > Advanced storage settings > Disks & volumes

NTFS Permissions

Permission	Allows
Full control	Everything, including changing permissions and taking ownership
Modify	Read, write, and delete files and folders
Read & execute	Open files and run programs
Read / Write	View content / create and change content
Inheritance	Child folders get the parent's permissions unless you stop it
With shares	Share and NTFS permissions both apply — the most restrictive wins

Permissions with icacls and Get-Acl

```
C:\> icacls C:\Lab                                  # who has what
C:\> icacls C:\Lab /grant student:(OI)(CI)M         # Modify, inherited by all
C:\> icacls C:\Lab /remove student
C:\> icacls C:\Lab /save C:\Backup\lab-acl.txt /T   # back up permissions
C:\> takeown /f C:\Old\locked.txt                   # take ownership (admin)

PS C:\> (Get-Acl C:\Lab).Access | Select-Object IdentityReference, FileSystemRights, IsInherited
#  (OI) object inherit  (CI) container inherit  F=Full  M=Modify  RX=Read&Execute
```

BitLocker and Device Encryption

Feature	Notes
Device encryption	Many Home PCs: turns on automatically with a Microsoft account
BitLocker	Pro and higher: full control, TPM + PIN, policies
BitLocker To Go	Encrypt USB drives with a password
Protects against	Stolen or lost laptops and removed disks
Recovery key	48 digits — Microsoft account, work account (Entra ID), or print it
Before BIOS/hardware changes	Suspend BitLocker, or have the recovery key ready

BitLocker from the Command Line

```
C:\> manage-bde -status                          # every volume: encrypted? method?
C:\> manage-bde -protectors -get C:              # shows the recovery password ID

PS C:\> Get-BitLockerVolume | Select-Object MountPoint, VolumeStatus, EncryptionPercentage,
ProtectionStatus
PS C:\> Enable-BitLocker -MountPoint D: -EncryptionMethod XtsAes256 -RecoveryPasswordProtector
PS C:\> (Get-BitLockerVolume D:).KeyProtector     # save this recovery password!
PS C:\> Suspend-BitLocker -MountPoint C: -RebootCount 1     # before a BIOS update
PS C:\> Resume-BitLocker -MountPoint C:
```

Windows Security at a Glance

Area	What to check
Virus & threat protection	Microsoft Defender Antivirus on, real-time, up to date
Ransomware protection	Controlled folder access; OneDrive file recovery
Account protection	Windows Hello, Dynamic lock
Firewall & network protection	All profiles on (Lesson 10)
App & browser control	SmartScreen; Smart App Control on new installs
Device security	Core isolation (memory integrity), TPM, Secure Boot

Microsoft Defender from PowerShell

```
PS C:\> Get-MpComputerStatus | Select-Object AntivirusEnabled, RealTimeProtectionEnabled,
          AntivirusSignatureLastUpdated, QuickScanEndTime
PS C:\> Update-MpSignature                          # get the newest definitions
PS C:\> Start-MpScan -ScanType QuickScan
PS C:\> Start-MpScan -ScanType CustomScan -ScanPath D:\Downloads
PS C:\> Get-MpThreatDetection                       # what was found and when
PS C:\> Set-MpPreference -EnableControlledFolderAccess Enabled   # ransomware shield
```

Managing Windows Update

Setting	Where / why
Patch Tuesday	Security updates on the second Tuesday of each month
Active hours	Prevents restarts while you work
Pause updates	Up to a few weeks — then updates install before you can pause again
Optional updates	Advanced options > Optional updates: drivers, previews
Update history	See what installed; uninstall a problem update
Command line	Get-HotFix | winget upgrade --all for apps

Backups: The 3-2-1 Rule

Tool	Protects	Notes
3-2-1 rule	Everything	3 copies, 2 different media, 1 off-site (cloud)
Windows Backup app	Settings, apps list, folders	To OneDrive; restores during new PC setup
OneDrive folder backup	Desktop, Documents, Pictures	Version history, ransomware recovery
File History	Your files, many versions	To an external drive or network share
System image (wbadmin)	The whole C: drive	Legacy but useful before big changes
Restore points	System files, drivers, registry	Not a backup of your documents

Lab: Protect a Folder End to End

```
PS C:\> Checkpoint-Computer -Description 'Before Lesson 11 lab' -RestorePointType MODIFY_SETTINGS
PS C:\> icacls C:\Lab /save C:\Backup\lab-acl.txt /T
PS C:\> robocopy C:\Lab E:\Backup\Lab /E /R:1 /W:1 /LOG:C:\Backup\robocopy.log
PS C:\> Get-BitLockerVolume E: | Select-Object VolumeStatus, ProtectionStatus
PS C:\> Start-MpScan -ScanType CustomScan -ScanPath C:\Lab
# Test the restore: delete one file in C:\Lab, then copy it back from E:\Backup\Lab
C:\> wbadmin start backup -backupTarget:E: -include:C: -allCritical -quiet   # system image
```

Summary & Homework

- Get-PhysicalDisk health, Get-Volume, Optimize-Volume -ReTrim
- icacls: grant (OI)(CI)M, /save before big changes
- BitLocker everywhere; know where every recovery key is
- Windows Security all green; Patch Tuesday; winget upgrade for apps
- Backups: 3-2-1, and test a restore
- Homework: find your BitLocker recovery key online right now

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.