
This lab is designed to help you gain hands-on experience using PowerShell for system administration tasks.

You will practice working with commands to manage files, services, processes, event logs, and system monitoring.

# Lab 2 - PowerShell Basics & System Administration

420-636-AB-Network Installation and Administration II

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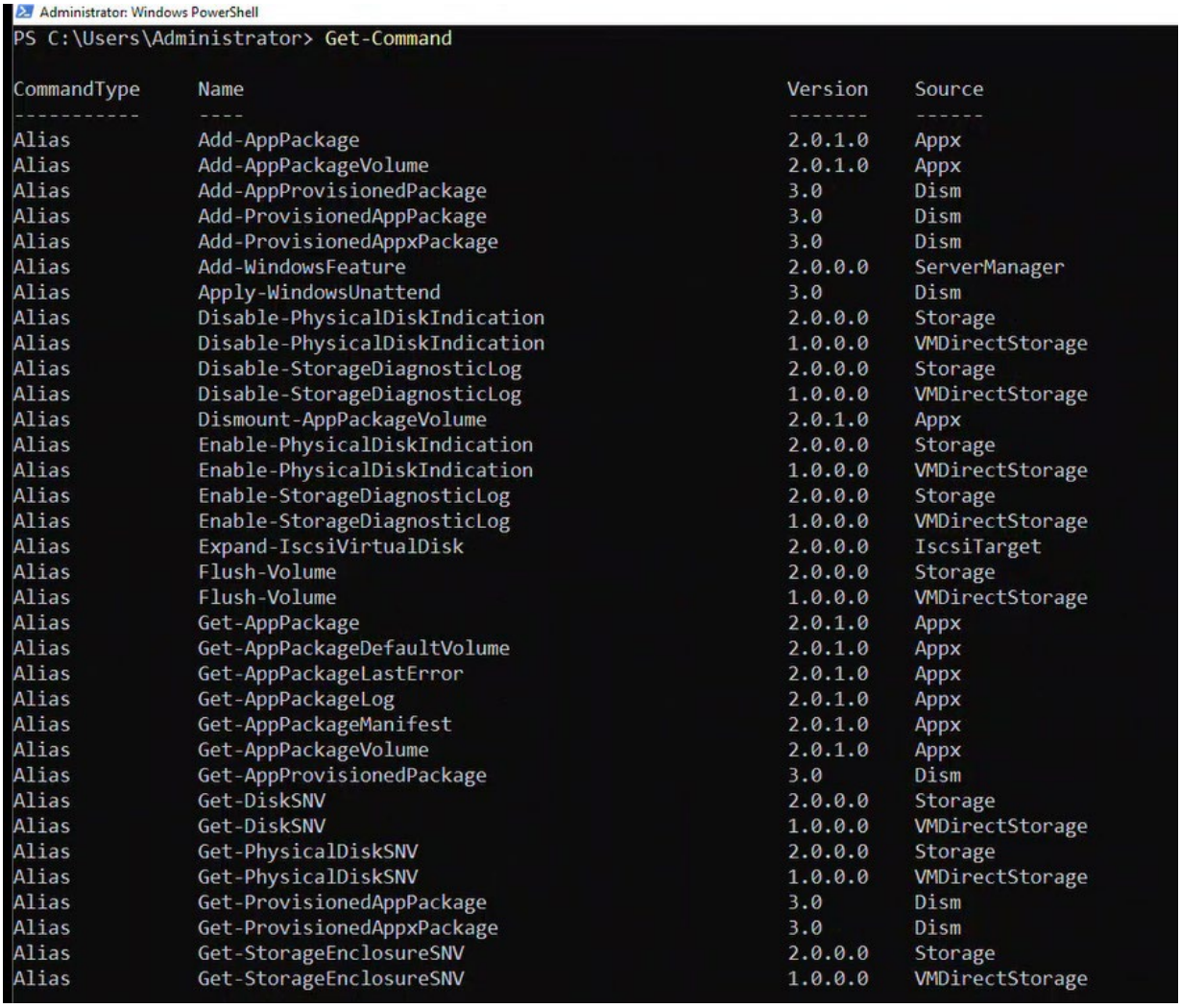
# 1 Task 1: Exploring PowerShell Commands

## 1.1 Identify available commands.

### 1.1.1 List all commands

**Get-command**




| CommandType | Name | Version | Source |
|---|---|---|---|
| Alias | Add-AppPackage | 2.0.1.0 | Appx |
| Alias | Add-AppPackageVolume | 2.0.1.0 | Appx |
| Alias | Add-AppProvisionedPackage | 3.0 | Dism |
| Alias | Add-ProvisionedAppPackage | 3.0 | Dism |
| Alias | Add-ProvisionedAppxPackage | 3.0 | Dism |
| Alias | Add-WindowsFeature | 2.0.0.0 | ServerManager |
| Alias | Apply-WindowsUnattend | 3.0 | Dism |
| Alias | Disable-PhysicalDiskIndication | 2.0.0.0 | Storage |
| Alias | Disable-PhysicalDiskIndication | 1.0.0.0 | VMDirectStorage |
| Alias | Disable-StorageDiagnosticLog | 2.0.0.0 | Storage |
| Alias | Disable-StorageDiagnosticLog | 1.0.0.0 | VMDirectStorage |
| Alias | Dismount-AppPackageVolume | 2.0.1.0 | Appx |
| Alias | Enable-PhysicalDiskIndication | 2.0.0.0 | Storage |
| Alias | Enable-PhysicalDiskIndication | 1.0.0.0 | VMDirectStorage |
| Alias | Enable-StorageDiagnosticLog | 2.0.0.0 | Storage |
| Alias | Enable-StorageDiagnosticLog | 1.0.0.0 | VMDirectStorage |
| Alias | Expand-IscsiVirtualDisk | 2.0.0.0 | IscsiTarget |
| Alias | Flush-Volume | 2.0.0.0 | Storage |
| Alias | Flush-Volume | 1.0.0.0 | VMDirectStorage |
| Alias | Get-AppPackage | 2.0.1.0 | Appx |
| Alias | Get-AppPackageDefaultVolume | 2.0.1.0 | Appx |
| Alias | Get-AppPackageLastError | 2.0.1.0 | Appx |
| Alias | Get-AppPackageLog | 2.0.1.0 | Appx |
| Alias | Get-AppPackageManifest | 2.0.1.0 | Appx |
| Alias | Get-AppPackageVolume | 2.0.1.0 | Appx |
| Alias | Get-AppProvisionedPackage | 3.0 | Dism |
| Alias | Get-DiskSNV | 2.0.0.0 | Storage |
| Alias | Get-DiskSNV | 1.0.0.0 | VMDirectStorage |
| Alias | Get-PhysicalDiskSNV | 2.0.0.0 | Storage |
| Alias | Get-PhysicalDiskSNV | 1.0.0.0 | VMDirectStorage |
| Alias | Get-ProvisionedAppPackage | 3.0 | Dism |
| Alias | Get-ProvisionedAppxPackage | 3.0 | Dism |
| Alias | Get-StorageEnclosureSNV | 2.0.0.0 | Storage |
| Alias | Get-StorageEnclosureSNV | 1.0.0.0 | VMDirectStorage |

### 1.1.2 Filtering Commands

#### *1.1.2.1 List only cmdlets:*

**Get-Command -CommandType Cmdlet**

```
PS C:\Users\Administrator> ### Filtering Commands
PS C:\Users\Administrator> ##List only cmdlets:
PS C:\Users\Administrator> Get-Command -CommandType Cmdlet

CommandType     Name                                               Version    Source
-----------     ----                                               -------    ------
Cmdlet          Add-AppvClientConnectionGroup                      1.0.0.0    AppvClient
Cmdlet          Add-AppvClientPackage                              1.0.0.0    AppvClient
Cmdlet          Add-AppvPublishingServer                           1.0.0.0    AppvClient
Cmdlet          Add-AppxPackage                                    2.0.1.0    Appx
Cmdlet          Add-AppxProvisionedPackage                         3.0        Dism
Cmdlet          Add-AppxVolume                                     2.0.1.0    Appx
Cmdlet          Add-BitsFile                                       2.0.0.0    BitsTransfer
Cmdlet          Add-CertificateEnrollmentPolicyServer              1.0.0.0    PKI
Cmdlet          Add-ClusteriSCSITargetServerRole                   2.0.0.0    IscsiTarget
Cmdlet          Add-Computer                                       3.1.0.0    Microsoft.PowerShell.Management
Cmdlet          Add-Content                                        3.1.0.0    Microsoft.PowerShell.Management
Cmdlet          Add-History                                        3.0.0.0    Microsoft.PowerShell.Core
Cmdlet          Add-IscsiVirtualDiskTargetMapping                  2.0.0.0    IscsiTarget
Cmdlet          Add-JobTrigger                                     1.1.0.0    PSScheduledJob
Cmdlet          Add-KdsRootKey                                     1.0.0.0    Kds
Cmdlet          Add-LocalGroupMember                               1.0.0.0    Microsoft.PowerShell.LocalAccounts
Cmdlet          Add-Member                                          3.1.0.0    Microsoft.PowerShell.Utility
Cmdlet          Add-PSSnapin                                       3.0.0.0    Microsoft.PowerShell.Core
Cmdlet          Add-SignerRule                                     1.0        ConfigCI
Cmdlet          Add-Type                                           3.1.0.0    Microsoft.PowerShell.Utility
Cmdlet          Add-WindowsCapability                              3.0        Dism
Cmdlet          Add-WindowsDriver                                  3.0        Dism
Cmdlet          Add-WindowsImage                                   3.0        Dism
Cmdlet          Add-WindowsPackage                                 3.0        Dism
Cmdlet          Backup-AuditPolicy                                 1.0.0.0    SecurityCmdlets
Cmdlet          Backup-SecurityPolicy                              1.0.0.0    SecurityCmdlets
Cmdlet          Checkpoint-Computer                                3.1.0.0    Microsoft.PowerShell.Management
Cmdlet          Checkpoint-IscsiVirtualDisk                        2.0.0.0    IscsiTarget
Cmdlet          Clear-Content                                      3.1.0.0    Microsoft.PowerShell.Management
Cmdlet          Clear-EventLog                                     3.1.0.0    Microsoft.PowerShell.Management
Cmdlet          Clear-History                                      3.0.0.0    Microsoft.PowerShell.Core
Cmdlet          Clear-Item                                         3.1.0.0    Microsoft.PowerShell.Management
```

### *1.1.2.2 Find commands related to networking:*

**Get-Command -Name *Net***

```
Administrator: Windows PowerShell
PS C:\Users\Administrator> #Find commands related to networking:
PS C:\Users\Administrator> Get-Command -Name *Net*

CommandType     Name                                               Version    Source
-----------     ----                                               -------    ------
Function        Add-NetEventNetworkAdapter                         1.0.0.0    NetEventPacketCapture
Function        Add-NetEventPacketCaptureProvider                  1.0.0.0    NetEventPacketCapture
Function        Add-NetEventProvider                               1.0.0.0    NetEventPacketCapture
Function        Add-NetEventVFPProvider                            1.0.0.0    NetEventPacketCapture
Function        Add-NetEventVmNetworkAdapter                       1.0.0.0    NetEventPacketCapture
Function        Add-NetEventVmSwitch                               1.0.0.0    NetEventPacketCapture
Function        Add-NetEventVmSwitchProvider                       1.0.0.0    NetEventPacketCapture
Function        Add-NetEventWFPCaptureProvider                     1.0.0.0    NetEventPacketCapture
Function        Add-NetIPHttpsCertBinding                          1.0.0.0    NetworkTransition
Function        Add-NetLbfoTeamMember                              2.0.0.0    NetLbfo
Function        Add-NetLbfoTeamNic                                 2.0.0.0    NetLbfo
Function        Add-NetNatExternalAddress                          1.0.0.0    NetNat
Function        Add-NetNatStaticMapping                            1.0.0.0    NetNat
Function        Add-NetSwitchTeamMember                            1.0.0.0    NetSwitchTeam
Function        Add-VpnConnectionTriggerTrustedNetwork             2.0.0.0    VpnClient
Function        Copy-NetFirewallRule                               2.0.0.0    NetSecurity
Function        Copy-NetIPsecMainModeCryptoSet                     2.0.0.0    NetSecurity
Function        Copy-NetIPsecMainModeRule                          2.0.0.0    NetSecurity
Function        Copy-NetIPsecPhase1AuthSet                         2.0.0.0    NetSecurity
Function        Copy-NetIPsecPhase2AuthSet                         2.0.0.0    NetSecurity
Function        Copy-NetIPsecQuickModeCryptoSet                    2.0.0.0    NetSecurity
Function        Copy-NetIPsecRule                                  2.0.0.0    NetSecurity
Function        Disable-NetAdapter                                 2.0.0.0    NetAdapter
Function        Disable-NetAdapterBinding                          2.0.0.0    NetAdapter
Function        Disable-NetAdapterChecksumOffload                  2.0.0.0    NetAdapter
Function        Disable-NetAdapterEncapsulatedPacketTaskOffload    2.0.0.0    NetAdapter
Function        Disable-NetAdapterIPsecOffload                     2.0.0.0    NetAdapter
Function        Disable-NetAdapterLso                              2.0.0.0    NetAdapter
Function        Disable-NetAdapterPacketDirect                     2.0.0.0    NetAdapter
Function        Disable-NetAdapterPowerManagement                  2.0.0.0    NetAdapter
Function        Disable-NetAdapterQos                              2.0.0.0    NetAdapter
Function        Disable-NetAdapterRdma                             2.0.0.0    NetAdapter
Function        Disable-NetAdapterRsc                              2.0.0.0    NetAdapter
```

#### *1.1.2.3 Discover commands for remote sessions*

**Get-Command -Name *PSSession***

```
PS C:\Users\Administrator> #Discover commands for remote sessions:
PS C:\Users\Administrator> Get-Command -Name *PSSession*

CommandType     Name                                               Version    Source
-----------     ----                                               -------    ------
Cmdlet          Connect-PSSession                                  3.0.0.0    Microsoft.PowerShell.Core
Cmdlet          Disable-PSSessionConfiguration                     3.0.0.0    Microsoft.PowerShell.Core
Cmdlet          Disconnect-PSSession                               3.0.0.0    Microsoft.PowerShell.Core
Cmdlet          Enable-PSSessionConfiguration                      3.0.0.0    Microsoft.PowerShell.Core
Cmdlet          Enter-PSSession                                    3.0.0.0    Microsoft.PowerShell.Core
Cmdlet          Exit-PSSession                                     3.0.0.0    Microsoft.PowerShell.Core
Cmdlet          Export-PSSession                                   3.1.0.0    Microsoft.PowerShell.Utility
Cmdlet          Get-PSSession                                      3.0.0.0    Microsoft.PowerShell.Core
Cmdlet          Get-PSSessionCapability                            3.0.0.0    Microsoft.PowerShell.Core
Cmdlet          Get-PSSessionConfiguration                         3.0.0.0    Microsoft.PowerShell.Core
Cmdlet          Import-PSSession                                   3.1.0.0    Microsoft.PowerShell.Utility
Cmdlet          New-PSSession                                      3.0.0.0    Microsoft.PowerShell.Core
Cmdlet          New-PSSessionConfigurationFile                     3.0.0.0    Microsoft.PowerShell.Core
Cmdlet          New-PSSessionOption                                3.0.0.0    Microsoft.PowerShell.Core
Cmdlet          Receive-PSSession                                  3.0.0.0    Microsoft.PowerShell.Core
Cmdlet          Register-PSSessionConfiguration                    3.0.0.0    Microsoft.PowerShell.Core
Cmdlet          Remove-PSSession                                   3.0.0.0    Microsoft.PowerShell.Core
Cmdlet          Set-PSSessionConfiguration                         3.0.0.0    Microsoft.PowerShell.Core
Cmdlet          Test-PSSessionConfigurationFile                    3.0.0.0    Microsoft.PowerShell.Core
Cmdlet          Unregister-PSSessionConfiguration                  3.0.0.0    Microsoft.PowerShell.Core


PS C:\Users\Administrator>
```

## 1.2 Retrieve detailed help for a specific command.

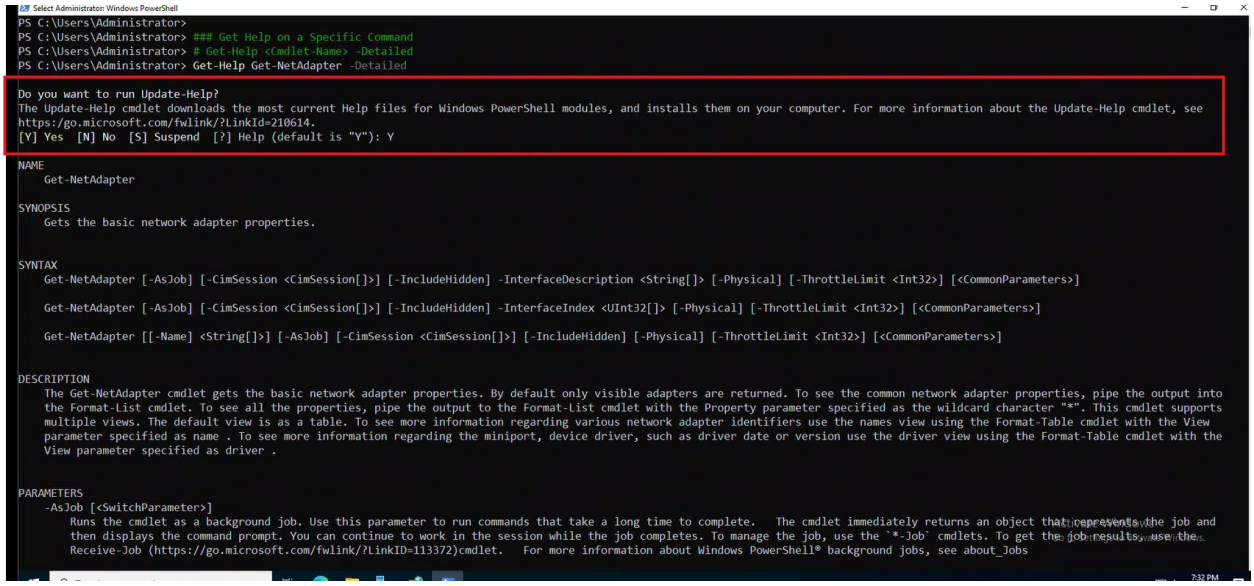
### 1.2.1 Get basic syntax

**Get-Help <Cmdlet-Name> -Detailed**

### 1.2.2 Retrieve detailed help for a specific PowerShell command

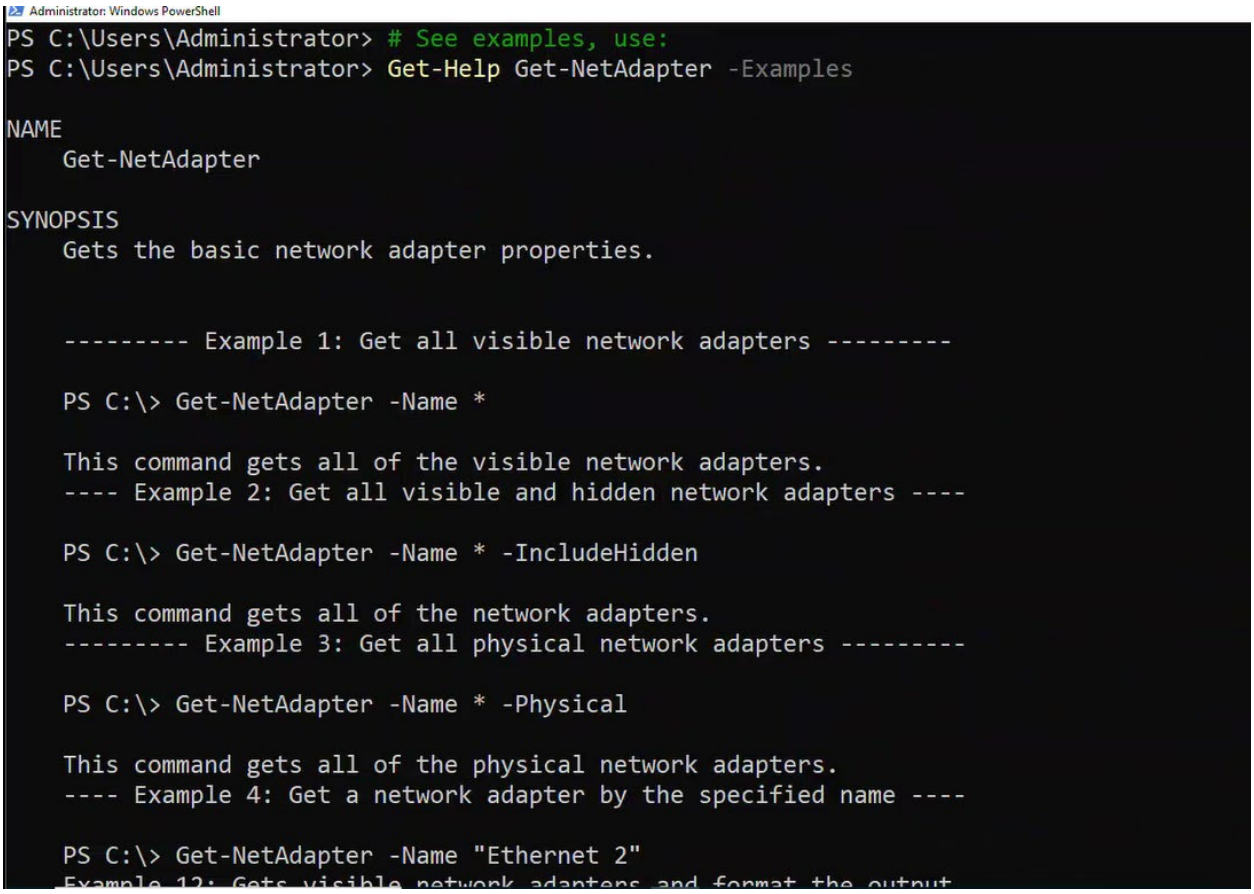
**Get-Help Get-NetAdapter -Detailed**

**Note - Update help will be loaded when running for first time**



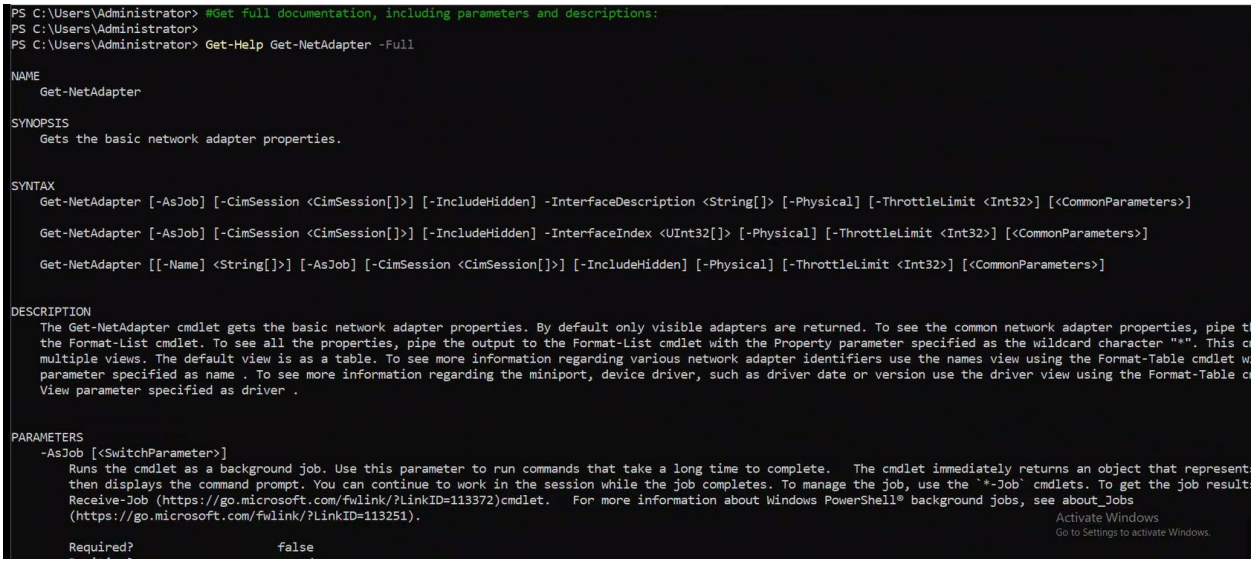

## 1.2.3 Get examples

### Get-Help Get-NetAdapter -Examples



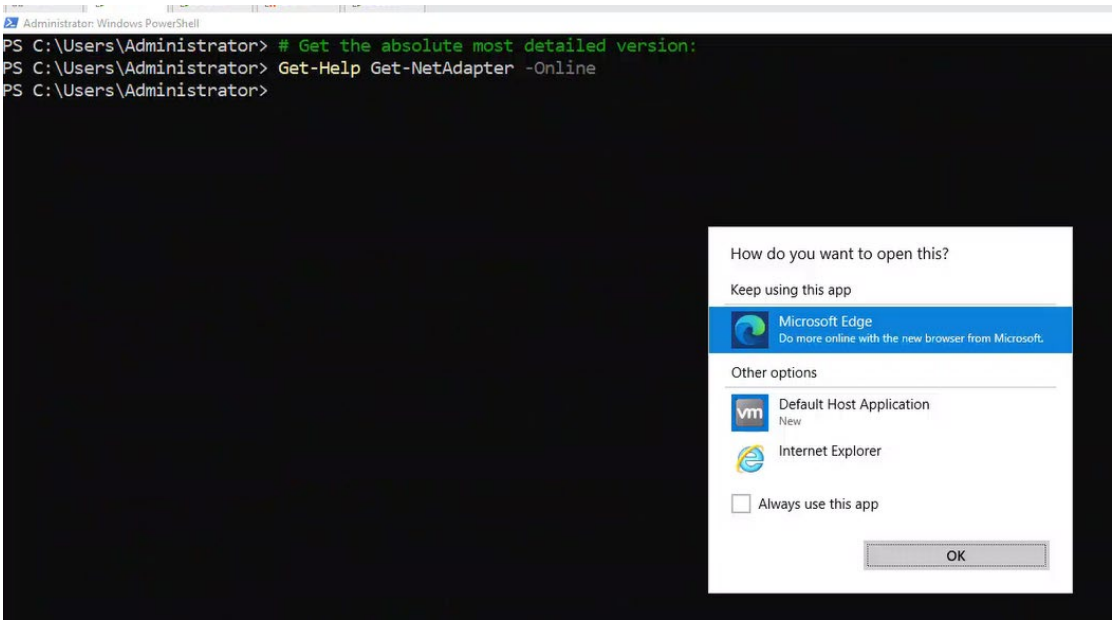
## 1.2.4 Get full documentation, including parameters and descriptions:

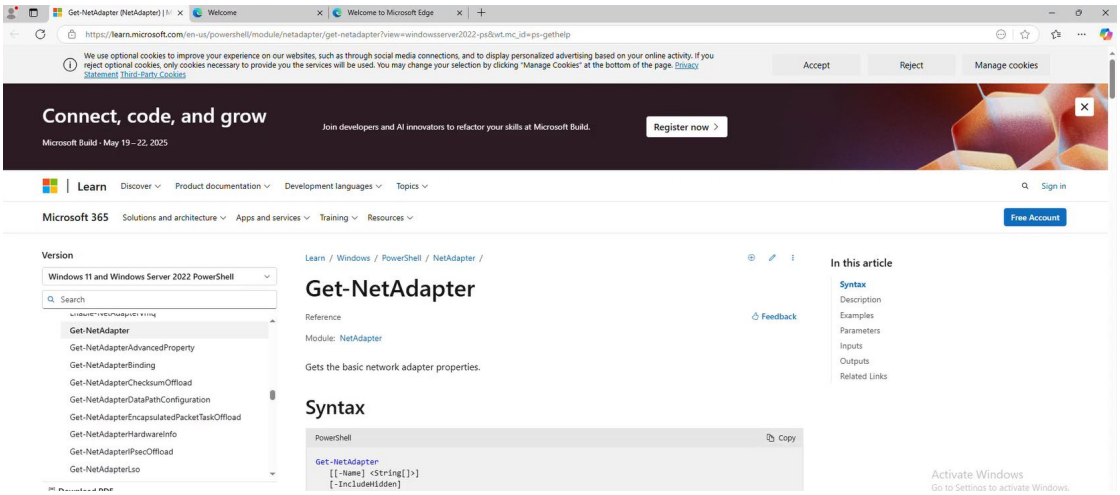
### Get-Help Get-NetAdapter -Full




## 1.2.5 Get online detailed version

### Get-Help Get-NetAdapter -Online





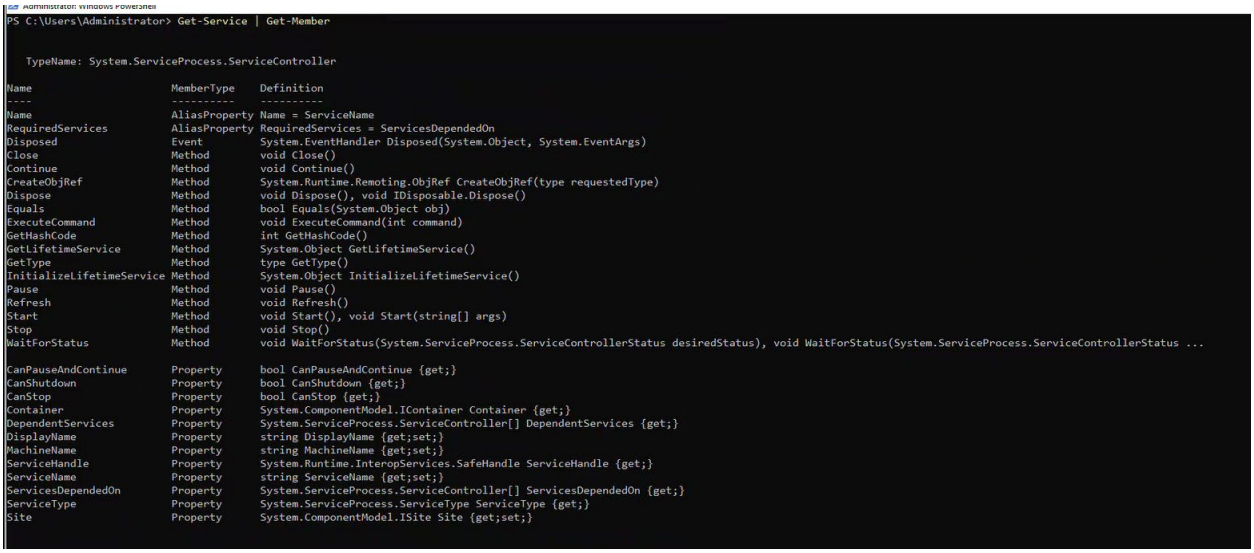

## 1.3 List all properties and methods of an object.

### 1.3.1 Basic Syntax

To list all properties and methods of an object in , use the `Get-Member` cmdlet:

**Get-Service | Get-Member**

This lists all methods and properties of objects returned by `Get-Service` .



## 1.3.2 Inspect a Specific Object

To check properties and methods for a specific object, use:

**$object = Get-NetAdapter**

**$object | Get-Member**

```
PS C:\Users\Administrator> $object = Get-NetAdapter
PS C:\Users\Administrator> $object | Get-Member


   TypeName: Microsoft.Management.Infrastructure.CimInstance#ROOT/StandardCimv2/MSFT_NetAdapter

Name                                    MemberType     Definition
----                                    ----------     ----------
DriverVersion                           AliasProperty  DriverVersion = DriverVersionString
ifAlias                                 AliasProperty  ifAlias = Name
ifDesc                                  AliasProperty  ifDesc = InterfaceDescription
ifIndex                                 AliasProperty  ifIndex = InterfaceIndex
ifName                                  AliasProperty  ifName = InterfaceName
InterfaceAlias                          AliasProperty  InterfaceAlias = Name
LinkLayerAddress                        AliasProperty  LinkLayerAddress = MacAddress
Clone                                   Method         System.Object ICloneable.Clone()
Dispose                                 Method         void Dispose(), void IDisposable.Dispose()
Equals                                  Method         bool Equals(System.Object obj)
GetCimSessionComputerName               Method         string GetCimSessionComputerName()
GetCimSessionInstanceId                 Method         guid GetCimSessionInstanceId()
GetHashCode                             Method         int GetHashCode()
GetObjectData                           Method         void GetObjectData(System.Runtime.Serialization.SerializationInfo info, System.Runtime.Serialization.StreamingContext con...
GetType                                 Method         type GetType()
ToString                                Method         string ToString()
ActiveMaximumTransmissionUnit           Property       uint64 ActiveMaximumTransmissionUnit {get;set;}
AdditionalAvailability                  Property       uint16[] AdditionalAvailability {get;set;}
AdminLocked                             Property       bool AdminLocked {get;}
AutoSense                               Property       bool AutoSense {get;set;}
Availability                            Property       uint16 Availability {get;set;}
AvailableRequestedStates                Property       uint16[] AvailableRequestedStates {get;set;}
Caption                                 Property       string Caption {get;set;}
CommunicationStatus                     Property       uint16 CommunicationStatus {get;set;}
ComponentID                             Property       string ComponentID {get;}
ConnectorPresent                        Property       bool ConnectorPresent {get;}
CreationClassName                       Property       string CreationClassName {get;set;}
Description                             Property       string Description {get;set;}
DetailedStatus                          Property       uint16 DetailedStatus {get;set;}
DeviceID                                Property       string DeviceID {get;set;}
DeviceName                              Property       string DeviceName {get;}
DeviceWakeUpEnable                      Property       bool DeviceWakeUpEnable {get;}
DriverDate                              Property       string DriverDate {get;}
DriverDateData                          Property       uint64 DriverDateData {get;}
DriverDescription                       Property       string DriverDescription {get;}
DriverMajorNdisVersion                  Property       byte DriverMajorNdisVersion {get;}
```



## 1.3.3 Filtering for Only Properties or Methods

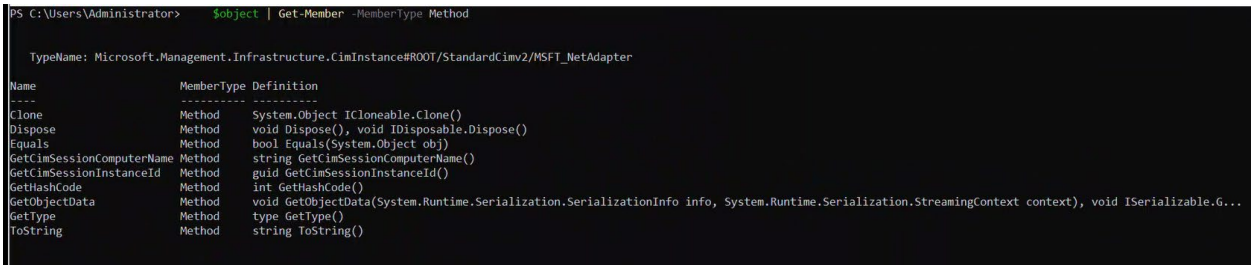
### *1.3.3.1 List only properties:*

**$object | Get-Member -MemberType Property**

```
PS C:\Users\Administrator>   $object | Get-Member -MemberType Property


   TypeName: Microsoft.Management.Infrastructure.CimInstance#ROOT/StandardCimv2/MSFT_NetAdapter

Name                                    MemberType Definition
----                                    ---------- ----------
ActiveMaximumTransmissionUnit           Property   uint64 ActiveMaximumTransmissionUnit {get;set;}
AdditionalAvailability                  Property   uint16[] AdditionalAvailability {get;set;}
AdminLocked                             Property   bool AdminLocked {get;}
AutoSense                               Property   bool AutoSense {get;set;}
Availability                            Property   uint16 Availability {get;set;}
AvailableRequestedStates                Property   uint16[] AvailableRequestedStates {get;set;}
Caption                                 Property   string Caption {get;set;}
CommunicationStatus                     Property   uint16 CommunicationStatus {get;set;}
ComponentID                             Property   string ComponentID {get;}
ConnectorPresent                        Property   bool ConnectorPresent {get;}
CreationClassName                       Property   string CreationClassName {get;set;}
Description                             Property   string Description {get;set;}
DetailedStatus                          Property   uint16 DetailedStatus {get;set;}
DeviceID                                Property   string DeviceID {get;set;}
DeviceName                              Property   string DeviceName {get;}
DeviceWakeUpEnable                      Property   bool DeviceWakeUpEnable {get;}
DriverDate                              Property   string DriverDate {get;}
DriverDateData                          Property   uint64 DriverDateData {get;}
DriverDescription                       Property   string DriverDescription {get;}
DriverMajorNdisVersion                  Property   byte DriverMajorNdisVersion {get;}
DriverMinorNdisVersion                  Property   byte DriverMinorNdisVersion {get;}
DriverName                              Property   string DriverName {get;}
DriverProvider                          Property   string DriverProvider {get;}
DriverVersionString                     Property   string DriverVersionString {get;}
ElementName                             Property   string ElementName {get;set;}
EnabledDefault                          Property   uint16 EnabledDefault {get;set;}
EnabledState                            Property   uint16 EnabledState {get;set;}
EndPointInterface                       Property   bool EndPointInterface {get;}
ErrorCleared                            Property   bool ErrorCleared {get;set;}
ErrorDescription                        Property   string ErrorDescription {get;set;}
FullDuplex                              Property   bool FullDuplex {get;set;}
```

#### *1.3.3.2 List only methods:*

**$object | Get-Member -MemberType Method**




# 2 Task 2: Working with Objects

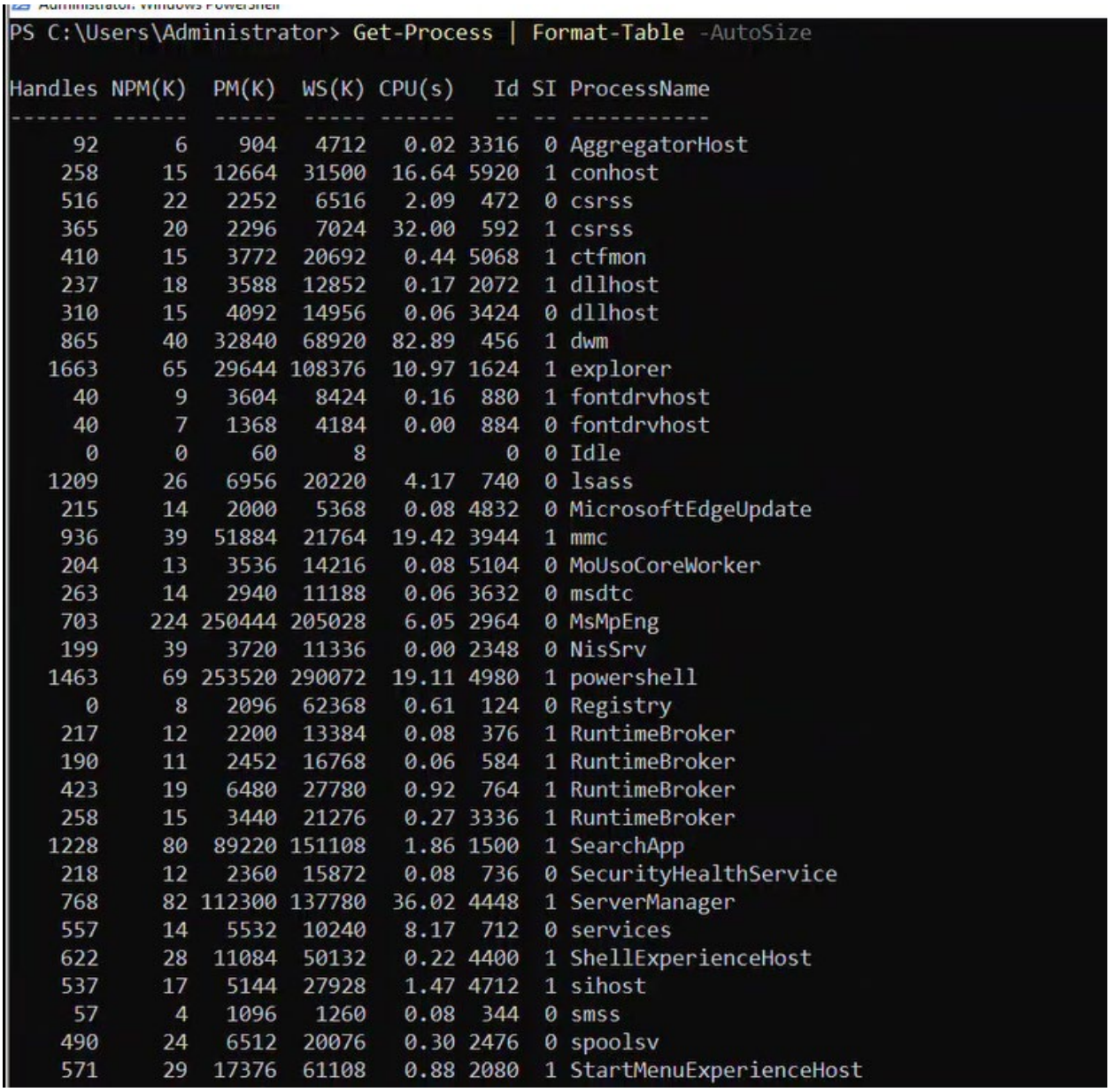
## 2.1 Display process information in table and list formats.

### 2.1.1 Table Format (Structured View)

Use the `Format-Table` cmdlet for a neatly organized table:

**Get-Process | Format-Table -AutoSize**

`-AutoSize` ensures columns adjust for readability.

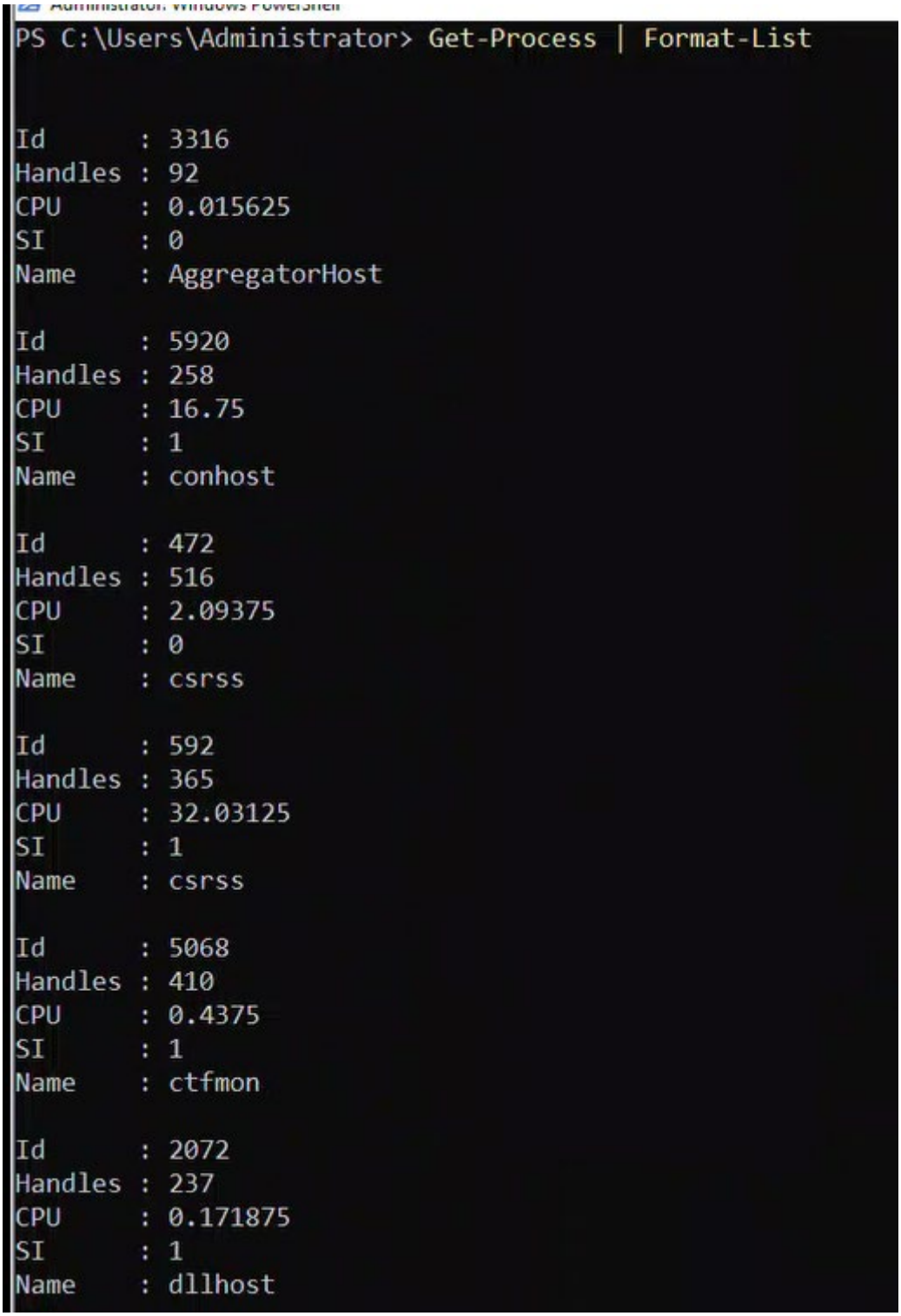


```
PS C:\Users\Administrator> Get-Process | Format-Table -AutoSize

Handles NPM(K)  PM(K)  WS(K) CPU(s)   Id SI ProcessName
------- ------  -----  ----- ------   -- -- -----------
     92      6    904   4712   0.02 3316  0 AggregatorHost
    258     15  12664  31500  16.64 5920  1 conhost
    516     22   2252   6516   2.09  472  0 csrss
    365     20   2296   7024  32.00  592  1 csrss
    410     15   3772  20692   0.44 5068  1 ctfmon
    237     18   3588  12852   0.17 2072  1 dllhost
    310     15   4092  14956   0.06 3424  0 dllhost
    865     40  32840  68920  82.89  456  1 dwm
   1663     65  29644 108376  10.97 1624  1 explorer
     40      9   3604   8424   0.16  880  1 fontdrvhost
     40      7   1368   4184   0.00  884  0 fontdrvhost
      0      0     60      8           0  0 Idle
   1209     26   6956  20220   4.17  740  0 lsass
    215     14   2000   5368   0.08 4832  0 MicrosoftEdgeUpdate
    936     39  51884  21764  19.42 3944  1 mmc
    204     13   3536  14216   0.08 5104  0 MoUsoCoreWorker
    263     14   2940  11188   0.06 3632  0 msdtc
    703    224 250444 205028   6.05 2964  0 MsMpEng
    199     39   3720  11336   0.00 2348  0 NisSrv
   1463     69 253520 290072  19.11 4980  1 powershell
      0      8   2096  62368   0.61  124  0 Registry
    217     12   2200  13384   0.08  376  1 RuntimeBroker
    190     11   2452  16768   0.06  584  1 RuntimeBroker
    423     19   6480  27780   0.92  764  1 RuntimeBroker
    258     15   3440  21276   0.27 3336  1 RuntimeBroker
   1228     80  89220 151108   1.86 1500  1 SearchApp
    218     12   2360  15872   0.08  736  0 SecurityHealthService
    768     82 112300 137780  36.02 4448  1 ServerManager
    557     14   5532  10240   8.17  712  0 services
    622     28  11084  50132   0.22 4400  1 ShellExperienceHost
    537     17   5144  27928   1.47 4712  1 sihost
     57      4   1096   1260   0.08  344  0 smss
    490     24   6512  20076   0.30 2476  0 spoolsv
    571     29  17376  61108   0.88 2080  1 StartMenuExperienceHost
```

### 2.1.2 List Format (Detailed View)

Use `Format-List` to display processes in a detailed list format:

**Get-Process | Format-List**




### 2.1.3 Custom Table View

If you only need specific details (like process name & ID), format the table like this:

### Get-Process | Format-Table Name, Id, CPU, MemoryUsage -AutoSize

```
PS C:\Users\Administrator> Get-Process | Format-Table Name, Id, CPU, MemoryUsage -AutoSize

Name                        Id        CPU MemoryUsage
----                        --        --- -----------
AggregatorHost            3316   0.015625
conhost                   5920    17.5625
csrss                      472    2.09375
csrss                      592     32.125
ctfmon                    5068     0.4375
dllhost                   2072   0.171875
dllhost                   3424     0.0625
dwm                        456   83.71875
explorer                  1624   10.96875
fontdrvhost                880    0.15625
fontdrvhost                884         0
Idle                         0
lsass                      740   4.171875
MicrosoftEdgeUpdate       4832   0.078125
mmc                       3944    19.4375
MoUsoCoreWorker           5104   0.078125
msdtc                     3632     0.0625
MsMpEng                   2964   6.046875
NisSrv                    2348         0
powershell                4980      19.25
Registry                   124   0.609375
RuntimeBroker              376   0.078125
RuntimeBroker              584     0.0625
RuntimeBroker              764   0.921875
RuntimeBroker             3336   0.265625
SearchApp                 1500   1.859375
SecurityHealthService      736   0.078125
ServerManager             4448  36.015625
services                   712   8.203125
ShellExperienceHost       4400    0.21875
sihost                    4712    1.46875
smss                       344   0.078125
spoolsv                   2476   0.296875
StartMenuExperienceHost   2080      0.875
```

## 2.2 Sort processes based on CPU usage.

### Get-Process | Sort-Object -Property CPU -Descending

`Sort-Object -Descending` ensures processes with the highest CPU usage appear at the top.

```
PS C:\Users\Administrator>   Get-Process | Sort-Object -Property CPU -Descending

Handles  NPM(K)    PM(K)      WS(K)     CPU(s)      Id  SI ProcessName
-------  ------    -----      -----     ------      --  -- -----------
   2322       0       40        128     166.50       4   0 System
    427      20    13356      23468     147.84    2748   0 svchost
    865      40    33036      68928      84.20     456   1 dwm
    418      21    15456      30104      75.13    3568   0 WmiPrvSE
    765      81   112116     137692      36.02    4448   1 ServerManager
    366      20     2232       7008      32.20     592   1 csrss
    312      20    15660      19796      29.06    6076   0 svchost
    404      25    10672      24372      21.19    2684   0 vmtoolsd
    393      16    16664      21136      20.59    1120   0 svchost
    946      40    51984      21916      19.44    3944   1 mmc
   1214      69   218052     254788      19.34    4980   1 powershell
    258      15    12664      31500      17.72    5920   1 conhost
   1676      66    29776     108164      11.03    1624   1 explorer
    539      14     5340      10156       8.20     712   0 services
    462      28    20840      41332       6.27    5804   1 vmtoolsd
    699     222   249904     203732       6.05    2964   0 MsMpEng
    947      18     8656      15516       5.77     964   0 svchost
    702      29    12936      27564       4.88    5740   0 svchost
   1202      26     6872      20172       4.17     740   0 lsass
   1005      21     7252      23856       3.94     852   0 svchost
    253      15     3124       8984       3.42    1860   0 svchost
    265      14     2660      12316       2.84     672   1 winlogon
    409      33     8336      18192       2.81    2100   0 svchost
    273      18     2992      14284       2.72    5660   0 svchost
    233      11     2392       8260       2.19    1320   0 svchost
    502      21     2188       6488       2.09     472   0 csrss
    391      19     5172      16348       1.98    1584   0 svchost
    555      25    17156      34744       1.89    2548   0 svchost
   1228      80    89220     151108       1.86    1500   1 SearchApp
    528      23    10176      44224       1.78    2056   1 TextInputHost
    420      14     2960      11228       1.75    1888   0 svchost
    254      14     3340      13508       1.69    2760   0 svchost
    524      16     5052      27872       1.47    4712   1 sihost
    359      13     2916      10800       1.34    1008   0 svchost
```

### 2.2.1 Additional Customization

If you want a table view for better readability:

**Get-Process | Sort-Object -Property CPU -Descending | Format-Table -AutoSize**

```
PS C:\Users\Administrator>   Get-Process | Sort-Object -Property CPU -Descending | Format-Table -AutoSize

Handles NPM(K)  PM(K)  WS(K) CPU(s)   Id SI ProcessName
------- ------  -----  ----- ------   -- -- -----------
   2340      0     40    128 166.77    4  0 System
    436     20  13308  23692 148.38 2748  0 svchost
    871     41  33076  69284  85.64  456  1 dwm
    421     21  19920  34628  75.36 3568  0 WmiPrvSE
    754     81 116392 141156  36.17 4448  1 ServerManager
    366     20   2232   7008  32.30  592  1 csrss
    310     20  15832  19916  29.23 6076  0 svchost
    404     25  10672  24372  21.19 2684  0 vmtoolsd
    393     16  16836  21272  20.77 1120  0 svchost
    959     40  52084  22080  19.44 3944  1 mmc
   1247     69 208400 245224  19.41 4980  1 powershell
    258     15  12912  31504  17.97 5920  1 conhost
   1690     66  30180 108612  11.16 1624  1 explorer
    537     13   5288  10156   8.27  712  0 services
    460     28  20876  41352   6.30 5804  1 vmtoolsd
    698    222 249864 204404   6.19 2964  0 MsMpEng
    953     18   8752  15616   5.80  964  0 svchost
    700     28  12888  27548   4.88 5740  0 svchost
   1198     26   6856  20148   4.17  740  0 lsass
   1007     21   7380  23900   3.95  852  0 svchost
    256     15   3044   8964   3.42 1860  0 svchost
    265     13   2660  12316   2.88  672  1 winlogon
    413     34   8404  18212   2.81 2100  0 svchost
    273     18   2992  14284   2.72 5660  0 svchost
    234     11   2328   8240   2.19 1320  0 svchost
    504     21   2188   6488   2.09  472  0 csrss
    393     19   5220  16356   2.00 1584  0 svchost
    555     25  17164  34752   1.89 2548  0 svchost
   1228     80  89220 150384   1.86 1500  1 SearchApp
    528     23  10176  44224   1.81 2056  1 TextInputHost
    420     14   2888  11208   1.75 1888  0 svchost
    254     14   3340  13508   1.69 2760  0 svchost
    524     16   5048  27868   1.47 4712  1 sihost
    358     13   2916  10800   1.34 1008  0 svchost
```

To show only specific properties  (like Name, ID, and CPU usage):

**Get-Process | Sort-Object -Property CPU -Descending | Select-Object Name, Id, CPU | Format-Table -AutoSize**

```
Administrator: Windows PowerShell
PS C:\Users\Administrator>   Get-Process | Sort-Object -Property CPU -Descending | Select-Object Name, Id, CPU | Format-Table -AutoSize

Name                     Id        CPU
----                     --        ---
System                    4 166.765625
svchost                2748 148.640625
dwm                     456    86.3125
WmiPrvSE               3568   75.40625
ServerManager          4448 36.171875
csrss                   592     32.375
svchost                6076 29.234375
vmtoolsd               2684    21.1875
svchost                1120 20.765625
powershell             4980 19.515625
mmc                    3944    19.4375
conhost                5920   18.15625
explorer               1624   11.15625
services                712 8.265625
vmtoolsd               5804 6.296875
MsMpEng                2964 6.203125
svchost                 964 5.796875
svchost                5740     4.875
lsass                   740 4.171875
svchost                 852 3.953125
svchost                1860    3.4375
winlogon                672     2.875
svchost                2100    2.8125
svchost                5660   2.71875
svchost                1320    2.1875
csrss                   472   2.09375
svchost                1584         2
svchost                2548   1.90625
SearchApp              1500 1.859375
TextInputHost          2056    1.8125
svchost                1888      1.75
svchost                2760    1.6875
sihost                 4712   1.46875
svchost                1008   1.34375
```

## 2.3 Select and filter objects based on specific conditions.

### 2.3.1 Select Specific Properties

If you want to display only certain attributes of an object, use:

Get-Process | Select-Object Name, Id, CPU

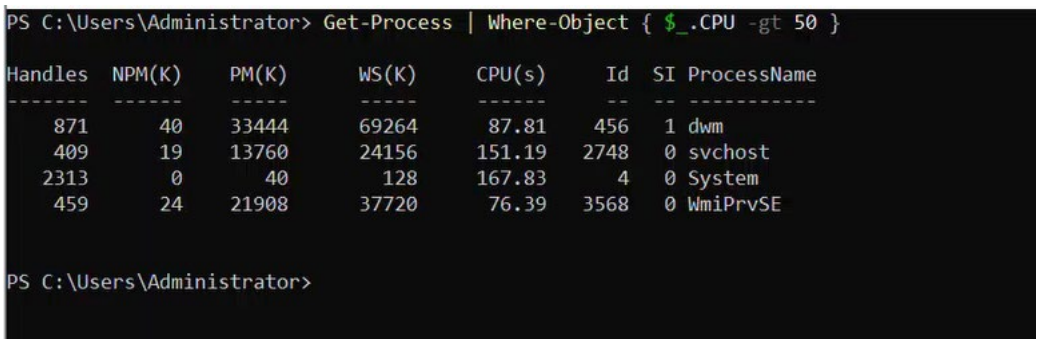
This will show only the Name, ID, and CPU usage of each process.

```
PS C:\Users\Administrator> Get-Process | Select-Object Name, Id, CPU

Name                      Id       CPU
----                      --       ---
AggregatorHost          3316  0.015625
conhost                 5920 18.328125
csrss                    472   2.09375
csrss                    592   32.4375
ctfmon                  5068    0.4375
dllhost                 2072  0.171875
dllhost                 3424    0.0625
dwm                      456 87.203125
explorer                1624  11.15625
fontdrvhost              880   0.15625
fontdrvhost              884         0
Idle                       0
lsass                    740  4.171875
MicrosoftEdgeUpdate     4832  0.078125
mmc                     3944      19.5
MoUsoCoreWorker         5104  0.078125
msdtc                   3632    0.0625
MsMpEng                 2964    6.3125
NisSrv                  2348         0
powershell              4980   19.5625
Registry                 124  0.609375
RuntimeBroker            376  0.078125
RuntimeBroker            584    0.0625
RuntimeBroker            764  0.921875
RuntimeBroker           3336  0.265625
SearchApp               1500  1.859375
SecurityHealthService    736  0.078125
ServerManager           4448 36.234375
services                 712  8.265625
ShellExperienceHost     4400   0.21875
sihost                  4712   1.46875
smss                     344  0.078125
spoolsv                 2476  0.296875
StartMenuExperienceHost 2080     0.875
```

### 2.3.2 Filter Objects Based on a Condition

If you need to filter objects, use `Where-Object`. For example, to list processes consuming more than 50% CPU, run:

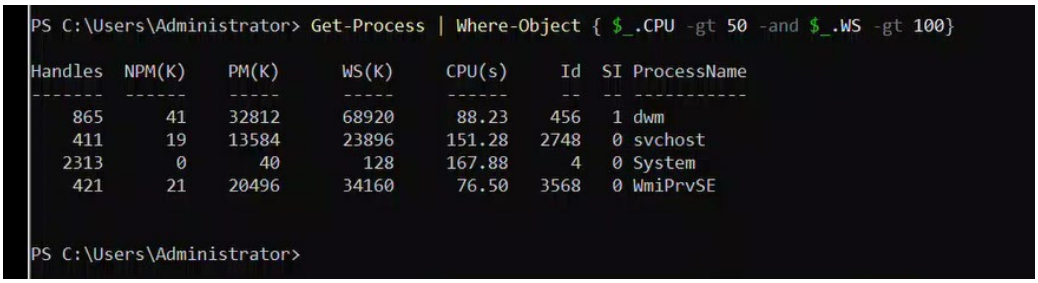
**Get-Process | Where-Object { $_.CPU -gt 50 }**




### 2.3.3 Filter Objects Using Multiple Conditions

To filter objects using multiple conditions, for example, selecting processes with CPU > 50 AND Memory usage > 100MB, use:

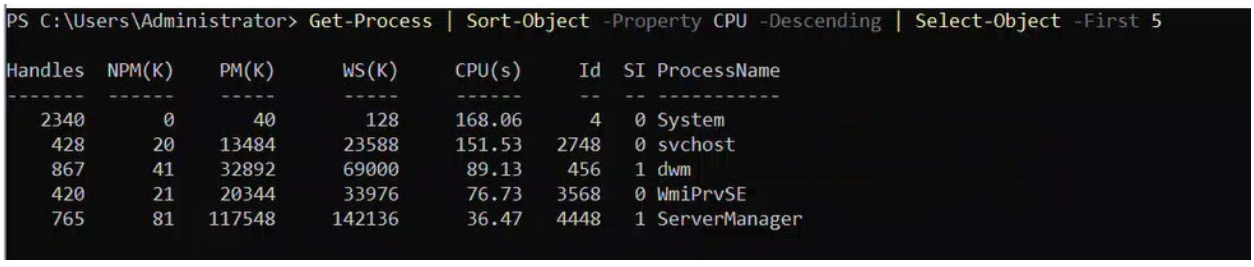
**Get-Process | Where-Object { $_.CPU -gt 50 -and $_.WS -gt 100 }**




### 2.3.4 Select Top N Results

If you want only the top 5 highest CPU-consuming processes, use:

**Get-Process | Sort-Object -Property CPU -Descending | Select-Object -First 5**



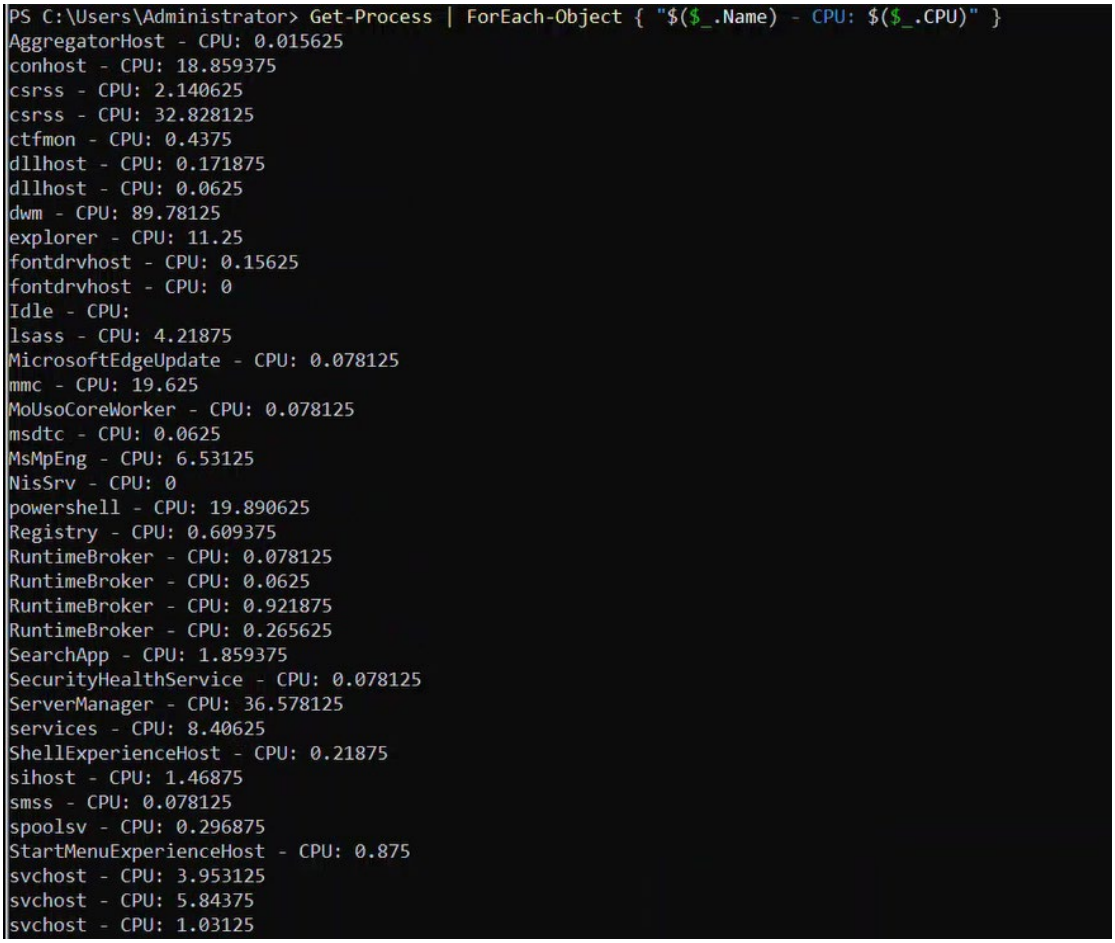
## 2.4 Loop through system objects and extract specific information.

To loop through system objects and extract specific information in PowerShell, use a `ForEach-Object` loop or a `foreach` statement.

### 2.4.1 Using `ForEach-Object` (Pipeline)

You can iterate over objects in a pipeline and extract specific properties. For example, listing all running processes with their name and CPU usage:

**Get-Process | ForEach-Object { "$($_.Name) - CPU: $($_.CPU)" }**




### 2.4.2 Using a `foreach` Loop

For more control, store the objects in a variable and loop through them:

**$processes = Get-Process**

**foreach ($process in $processes) {**

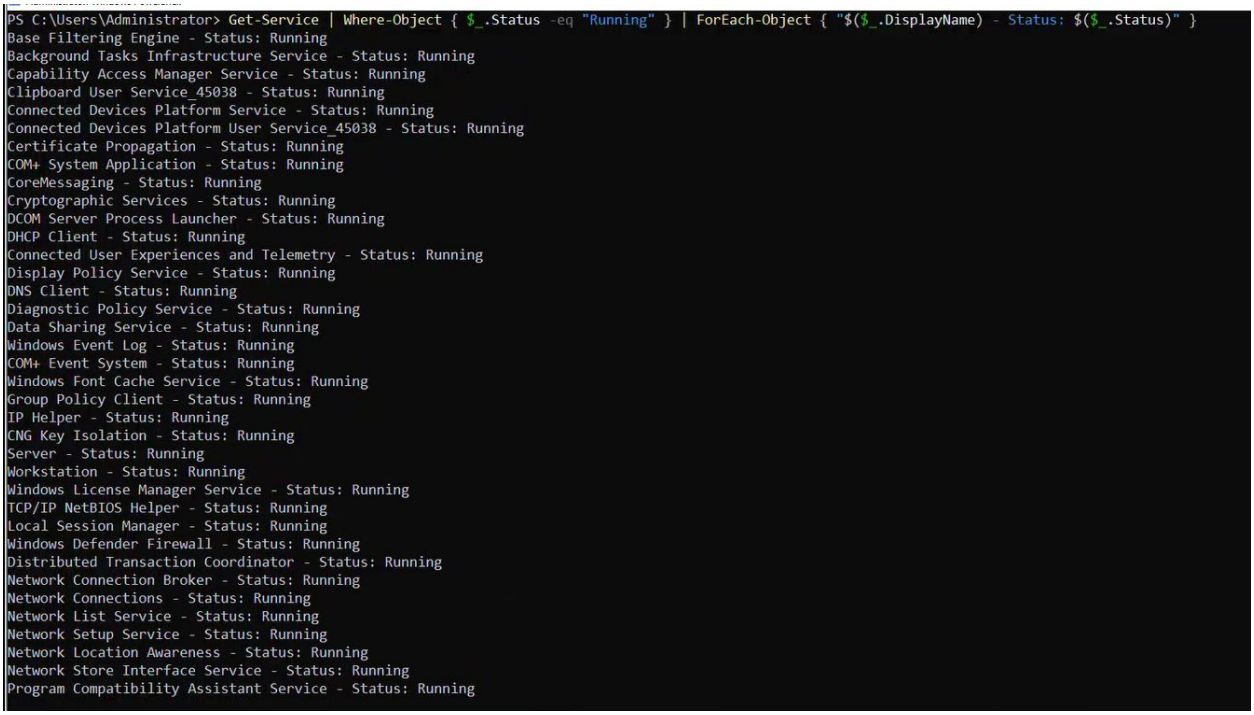
```
    Write-Host "Process: $($process.Name) - ID: $($process.Id) - CPU: $($process.CPU)"
}
```

```
PS C:\Users\Administrator> $processes = Get-Process
PS C:\Users\Administrator> foreach ($process in $processes) {
>>     Write-Host "Process: $($process.Name) - ID: $($process.Id) - CPU: $($process.CPU)"
>> }
Process: AggregatorHost - ID: 3316 - CPU: 0.015625
Process: conhost - ID: 5920 - CPU: 18.984375
Process: csrss - ID: 472 - CPU: 2.140625
Process: csrss - ID: 592 - CPU: 32.828125
Process: ctfmon - ID: 5068 - CPU: 0.46875
Process: dllhost - ID: 2072 - CPU: 0.171875
Process: dllhost - ID: 3424 - CPU: 0.0625
Process: dwm - ID: 456 - CPU: 89.984375
Process: explorer - ID: 1624 - CPU: 11.265625
Process: fontdrvhost - ID: 880 - CPU: 0.15625
Process: fontdrvhost - ID: 884 - CPU: 0
Process: Idle - ID: 0 - CPU:
Process: lsass - ID: 740 - CPU: 4.234375
Process: MicrosoftEdgeUpdate - ID: 4832 - CPU: 0.078125
Process: mmc - ID: 3944 - CPU: 19.625
Process: MoUsoCoreWorker - ID: 5104 - CPU: 0.078125
Process: msdtc - ID: 3632 - CPU: 0.0625
Process: MsMpEng - ID: 2964 - CPU: 6.59375
Process: NisSrv - ID: 2348 - CPU: 0
Process: powershell - ID: 4980 - CPU: 19.9375
Process: Registry - ID: 124 - CPU: 0.609375
Process: RuntimeBroker - ID: 376 - CPU: 0.078125
Process: RuntimeBroker - ID: 584 - CPU: 0.0625
Process: RuntimeBroker - ID: 764 - CPU: 0.921875
Process: RuntimeBroker - ID: 3336 - CPU: 0.265625
Process: SearchApp - ID: 1500 - CPU: 1.859375
Process: SecurityHealthService - ID: 736 - CPU: 0.078125
Process: ServerManager - ID: 4448 - CPU: 36.578125
Process: services - ID: 712 - CPU: 8.40625
Process: ShellExperienceHost - ID: 4400 - CPU: 0.21875
Process: sihost - ID: 4712 - CPU: 1.46875
Process: smss - ID: 344 - CPU: 0.078125
Process: spoolsv - ID: 2476 - CPU: 0.296875
Process: StartMenuExperienceHost - ID: 2080 - CPU: 0.875
```

### 2.4.3 Loop Through Services and Extract Specific Details

To list services that are running, with their status and display name:

```
Get-Service | Where-Object { $_.Status -eq "Running" } | ForEach-Object {
"$($_.DisplayName) - Status: $($_.Status)" }
```




# 3 Task 3: Managing the File System

## 3.1 Navigate through directories and list files.

**You can navigate through directories and list files in PowerShell using these commands:**

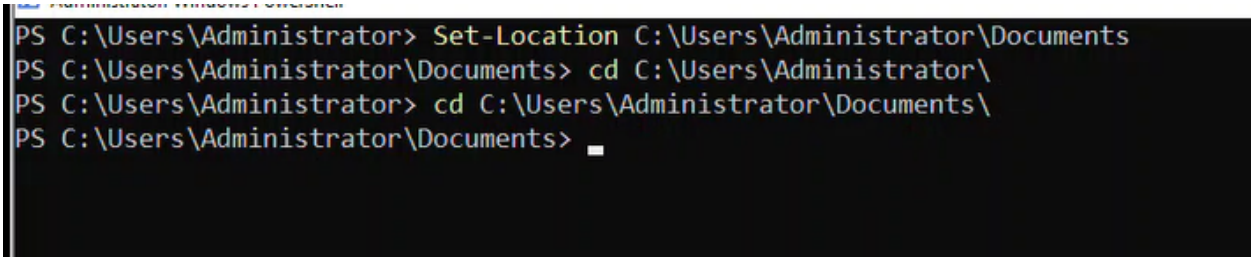
### 3.1.1 Change Directory (`cd` or `Set-Location`)

To move into a different directory:

**Set-Location C:\Users\Administrator\Documents**

or simply:

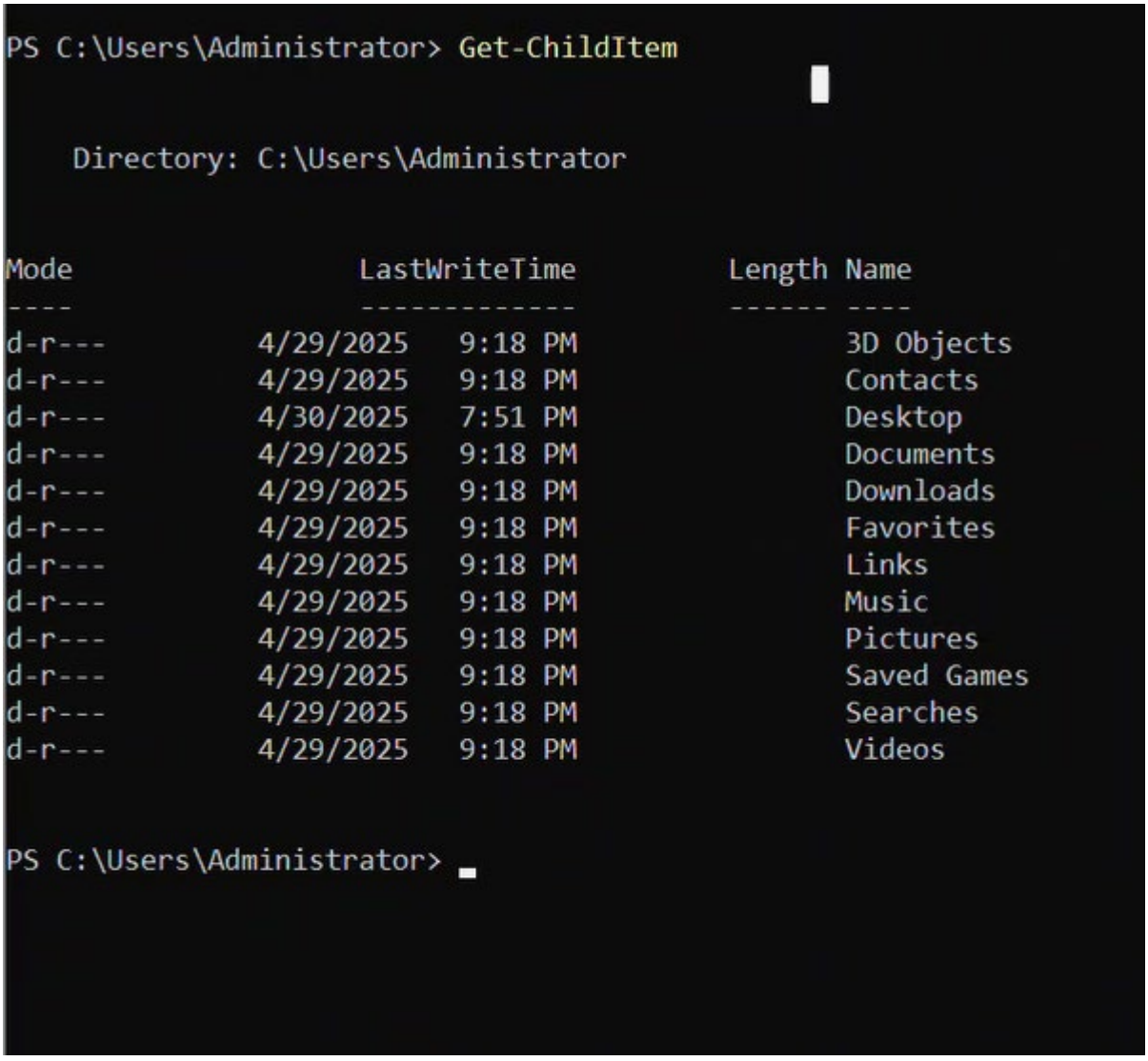
**cd C:\Users\Administrator\Documents**



### 3.1.2 List Files in a Directory (`Get-ChildItem`)

To display files and folders in the current directory:

**Get-ChildItem**




or specify a directory:

**Get-ChildItem C:\Users\Administrator**

```
PS C:\Users\Administrator\Documents> cd C:\Users\Administrator
PS C:\Users\Administrator> Get-ChildItem C:\Users\Administrator


    Directory: C:\Users\Administrator


Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
d-r---         4/29/2025   9:18 PM                3D Objects
d-r---         4/29/2025   9:18 PM                Contacts
d-r---         4/30/2025   7:51 PM                Desktop
d-r---         4/29/2025   9:18 PM                Documents
d-r---         4/29/2025   9:18 PM                Downloads
d-r---         4/29/2025   9:18 PM                Favorites
d-r---         4/29/2025   9:18 PM                Links
d-r---         4/29/2025   9:18 PM                Music
d-r---         4/29/2025   9:18 PM                Pictures
d-r---         4/29/2025   9:18 PM                Saved Games
d-r---         4/29/2025   9:18 PM                Searches
d-r---         4/29/2025   9:18 PM                Videos
```

### 3.1.3 Show Only Files (Exclude Folders)

To list only files, excluding directories:

**Get-ChildItem -File**

```
PS C:\Program Files\Common Files\System> cd  'C:\Program Files\Common Files\System\'
PS C:\Program Files\Common Files\System>
PS C:\Program Files\Common Files\System>
PS C:\Program Files\Common Files\System> Get-ChildItem -File


    Directory: C:\Program Files\Common Files\System


Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
-a----         7/7/2023   5:22 PM         958464 wab32.dll
-a----         7/7/2023   5:22 PM         974848 wab32res.dll
```

### 3.1.4 Show Only Folders (Exclude Files)

To list only directories, excluding files:

**Get-ChildItem -Directory**

```
PS C:\Program Files\Common Files\System> Get-ChildItem -Directory


    Directory: C:\Program Files\Common Files\System


Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
d-----         5/8/2021   5:36 AM                ado
d-----         5/8/2021   5:36 AM                en-US
d-----         5/8/2021   5:36 AM                msadc
d-----         7/7/2023   5:27 PM                Ole DB


PS C:\Program Files\Common Files\System>
```

### 3.1.5 List Files with Specific Extensions

To find only *.dll files, for example:

**Get-ChildItem -Path C:\Users\Administrator\Documents -Filter *.dll**

```
PS C:\Program Files\Common Files\System> Get-ChildItem -Path 'C:\Program Files\Common Files\System\' -Filter *.dll


    Directory: C:\Program Files\Common Files\System


Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
-a----         7/7/2023   5:22 PM         958464 wab32.dll
-a----         7/7/2023   5:22 PM         974848 wab32res.dll


PS C:\Program Files\Common Files\System>
```

### 3.1.6 Navigate Back to Previous Directory

To return to the previous directory:

**cd ..**

or

**Set-Location ..**

```
PS C:\Program Files\Common Files\System> cd ..
PS C:\Program Files\Common Files> Set-Location ..
PS C:\Program Files>
```

## 3.2 Create and delete files and folders

You can create and delete files and folders using commands.

### 3.2.1 Create a New File

To create a new file, use:

**New-Item -Path "C:\Users\Administrator\Documents\example.txt" -ItemType File**

```
PS C:\Program Files> New-Item -Path "C:\Users\Administrator\Documents\example.txt" -ItemType File


    Directory: C:\Users\Administrator\Documents


Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
-a----          5/1/2025  12:48 AM              0 example.txt


PS C:\Program Files>
```

### 3.2.2 Create a New Folder

To create a directory:

**New-Item -Path "C:\Users\Administrator\Documents\NewFolder" -ItemType Directory**

This creates "NewFolder" inside Documents .

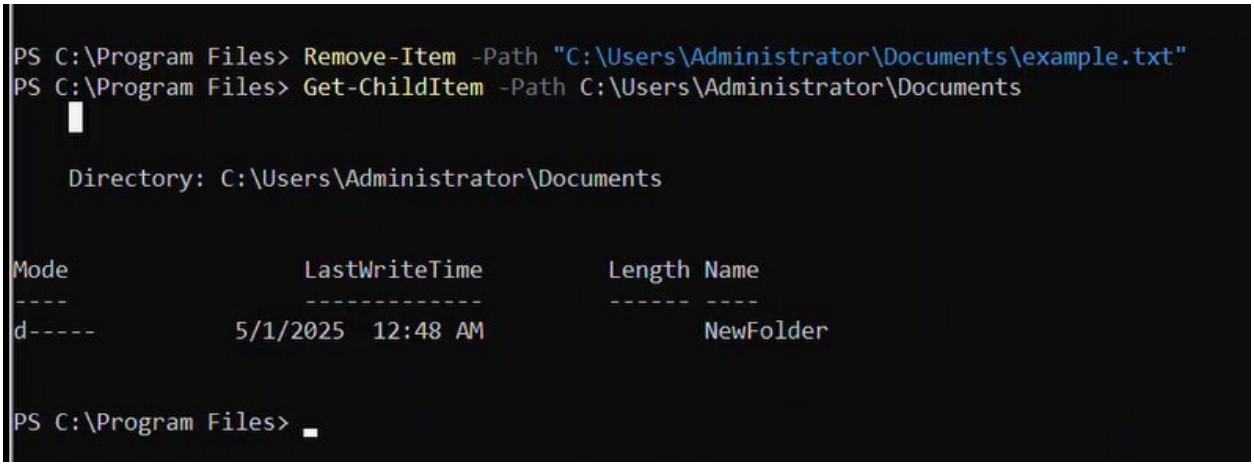
```
PS C:\Program Files> New-Item -Path "C:\Users\Administrator\Documents\NewFolder" -ItemType Directory


    Directory: C:\Users\Administrator\Documents


Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
d-----          5/1/2025  12:48 AM                NewFolder


PS C:\Program Files>
```

### 3.2.3 Delete a File

To remove a file:

**Remove-Item -Path "C:\Users\Administrator\Documents\example.txt"**

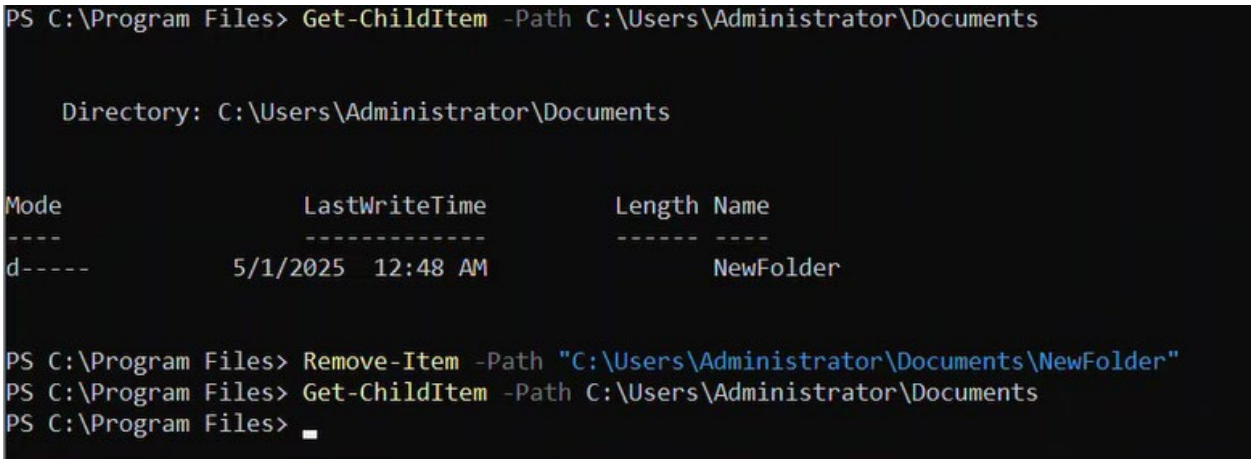
Add `-Force` to bypass confirmation if needed.




### 3.2.4 Delete a Folder

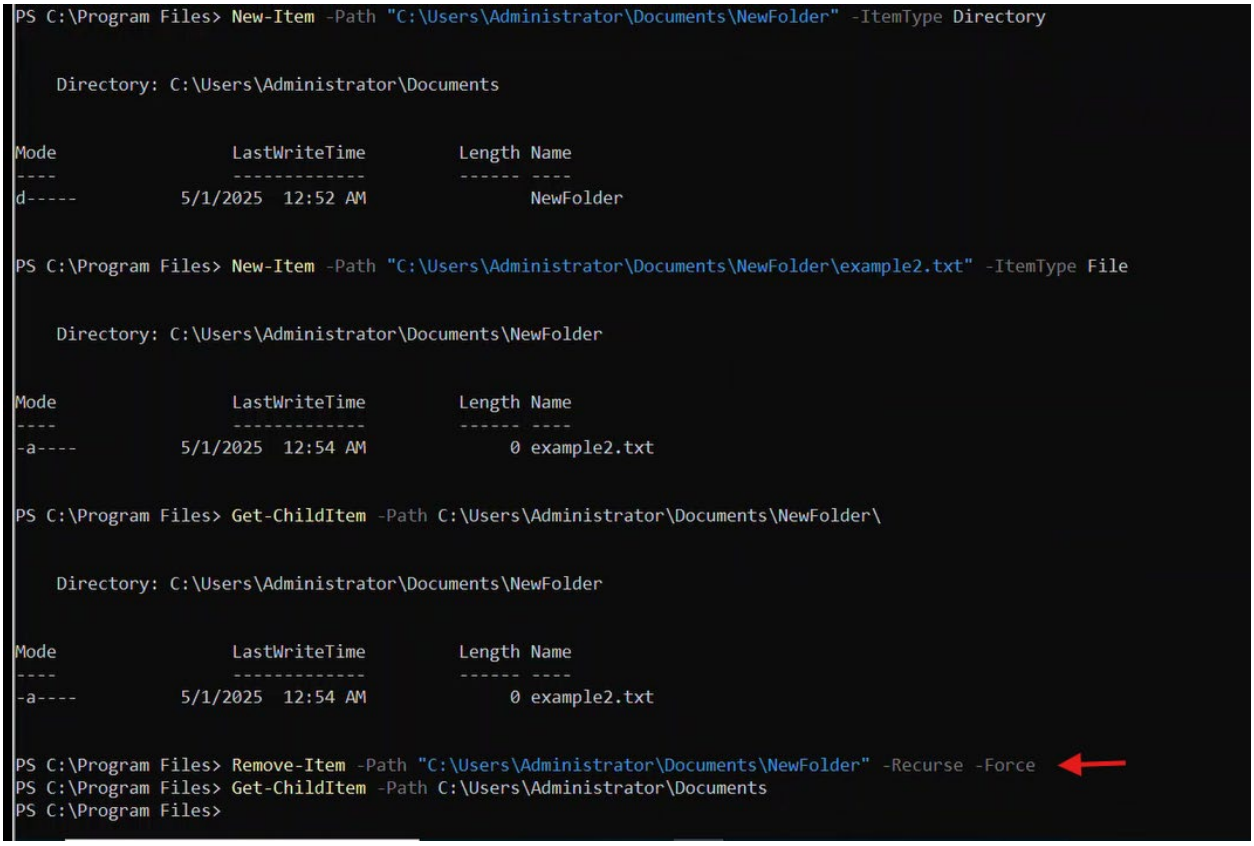
#### *3.2.4.1 To remove an empty folder:*

**Remove-Item -Path "C:\Users\Administrator\Documents\NewFolder"**



*3.2.4.2 To delete a folder with contents, use:*

**Remove-Item -Path "C:\Users\Administrator\Documents\NewFolder" -Recurse -Force**




## 3.3 Copy and move files between locations

### 3.3.1 Prepare

1. Create a new folder called "SourceFolder" inside C:\Users\Administrator\Documents

   **New-Item -Path "C:\Users\Administrator\Documents\SourceFolder" -ItemType Directory**

   This ensures the directory exists before copying or moving files.

2. Create a New File
   Create a new text file inside SourceFolder

**New-Item -Path "C:\Users\Administrator\Documents\SourceFolder\example.txt" -ItemType File**

This creates an empty file that can later be edited or copied.

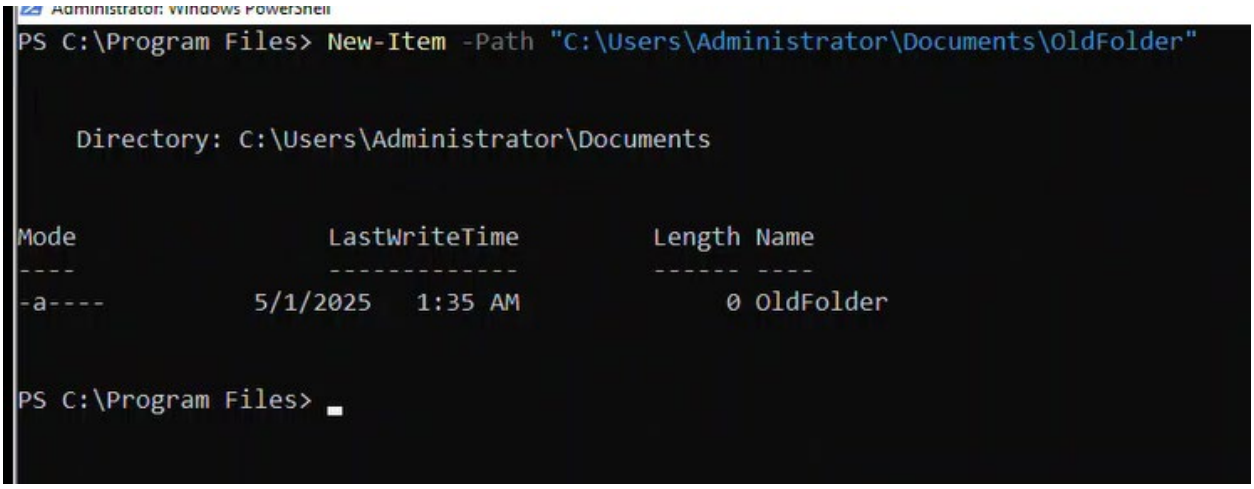
```
PS C:\Program Files> New-Item -Path "C:\Users\Administrator\Documents\SourceFolder" -ItemType Directory


    Directory: C:\Users\Administrator\Documents


Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
d-----         5/1/2025   1:17 AM                SourceFolder


PS C:\Program Files>  New-Item -Path "C:\Users\Administrator\Documents\SourceFolder\example.txt" -ItemType File


    Directory: C:\Users\Administrator\Documents\SourceFolder


Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
-a----         5/1/2025   1:17 AM              0 example.txt


PS C:\Program Files> _
```

3. This creates an empty file that can later be edited or copied.
   create destination Folder
   **New-Item -Path "C:\Users\Administrator\Documents\DestinationFolder" -ItemType Directory**

```
PS C:\Program Files> New-Item -Path "C:\Users\Administrator\Documents\DestinationFolder" -ItemType Directory


    Directory: C:\Users\Administrator\Documents


Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
d-----         5/1/2025   1:21 AM                DestinationFolder


PS C:\Program Files>
```

4. This creates an empty folder that can later be copied or moved

   **New-Item -Path "C:\Users\Administrator\Documents\OldFolder"**




### 3.3.2 Copy a File

Copy example.txt from SourceFolder to DestinationFolder

**Copy-Item -Path "C:\Users\Administrator\Documents\SourceFolder\example.txt" -Destination "C:\Users\Administrator\Documents\DestinationFolder\example.txt"**

The file remains in SourceFolder while being duplicated in DestinationFolder.


### 3.3.3 Copy an Entire Folder

Copy SourceFolder and all its contents to BackupFolder

**Copy-Item -Path "C:\Users\Administrator\Documents\SourceFolder" -Destination "C:\Users\Administrator\Documents\BackupFolder" -Recurse**

The `-Recurse` flag ensures that all files and subfolders are copied.


### 3.3.4 Move a File

Move example.txt from SourceFolder to DestinationFolder

**Move-Item -Path "C:\Users\Administrator\Documents\SourceFolder\example.txt" -Destination "C:\Users\Administrator\Documents\DestinationFolder\example.txt" -Force**

Unlike copying, this removes the file from SourceFolder and places it in DestinationFolder.

```
S C:\Program Files> Move-Item -Path "C:\Users\Administrator\Documents\SourceFolder\example.txt" -Destination "C:\Users\Administrator\Documents\DestinationFolder\example.txt" -Force
S C:\Program Files>
```

### 3.3.5 Move an Entire Folder

Move OldFolder and all contents into NewFolder

**Move-Item -Path "C:\Users\Administrator\Documents\OldFolder" -Destination "C:\Users\Administrator\Documents\NewFolder"**

```
PS C:\Program Files> Move-Item -Path "C:\Users\Administrator\Documents\OldFolder" -Destination "C:\Users\Administrator\Documents\NewFolder"
PS C:\Program Files>
```

The folder and its files will be transferred, leaving OldFolder empty or deleted.

```
PS C:\Users\Administrator\Documents> cd C:\Users\Administrator\Documents\
PS C:\Users\Administrator\Documents> Get-ChildItem


    Directory: C:\Users\Administrator\Documents


Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
d-----         5/1/2025   1:23 AM                BackupFolder
d-----         5/1/2025   1:28 AM                DestinationFolder
d-----         5/1/2025   1:17 AM                SourceFolder
-a----         5/1/2025   1:35 AM              0 NewFolder


PS C:\Users\Administrator\Documents>
```

### 3.3.6 Restore

1. Delete a File

   Delete example.txt from DestinationFolder

   **Remove-Item -Path "C:\Users\Administrator\Documents\DestinationFolder\example.txt"**

   Use `-Force` if you want to delete without confirmation.

2. Delete a Folder (With Contents)

   Delete BackupFolder and all its files

   **Remove-Item -Path "C:\Users\Administrator\Documents\DestinationFolder\example.txt"**

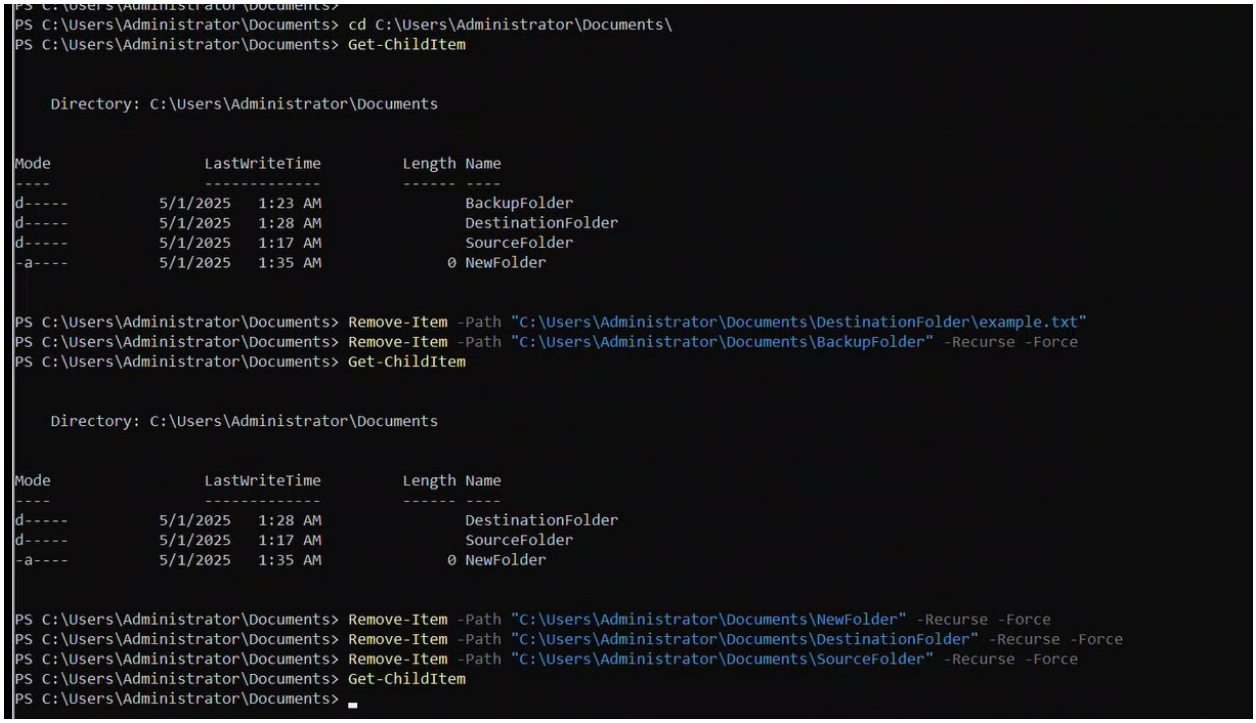
   **Remove-Item -Path "C:\Users\Administrator\Documents\BackupFolder" -Recurse -Force**

   **Remove-Item -Path "C:\Users\Administrator\Documents\NewFolder" -Recurse -Force**

   **Remove-Item -Path "C:\Users\Administrator\Documents\DestinationFolder" -Recurse -Force**

   **Remove-Item -Path "C:\Users\Administrator\Documents\SourceFolder" -Recurse -Force**

   This permanently removes the folder and its contents.



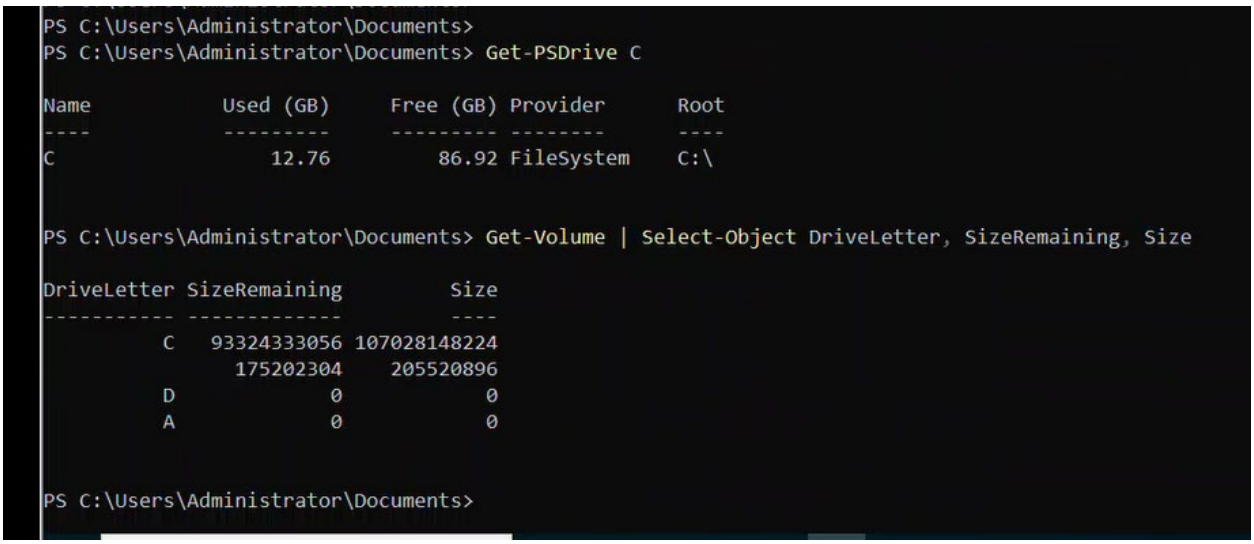
## 3.4 Check available disk space.

1. Get available disk space for the C: drive

   **Get-PSDrive C**

2. Retrieve detailed volume information, including free space

   **Get-Volume | Select-Object DriveLetter, SizeRemaining, Size**




# 4 Task 4: Managing System Services and Processes

## 4.1 List all running services on the system.

**Get-Service | Where-Object { $_.Status -eq "Running" }**

```
PS C:\Users\Administrator\Documents> Get-Service | Where-Object { $_.Status -eq "Running" }

Status   Name               DisplayName
------   ----               -----------
Running  BFE                Base Filtering Engine
Running  BrokerInfrastru... Background Tasks Infrastructure Ser...
Running  camsvc             Capability Access Manager Service
Running  cbdhsvc_45038      Clipboard User Service_45038
Running  CDPSvc             Connected Devices Platform Service
Running  CDPUserSvc_45038   Connected Devices Platform User Ser...
Running  CertPropSvc        Certificate Propagation
Running  COMSysApp          COM+ System Application
Running  CoreMessagingRe... CoreMessaging
Running  CryptSvc           Cryptographic Services
Running  DcomLaunch         DCOM Server Process Launcher
Running  Dhcp               DHCP Client
Running  DiagTrack          Connected User Experiences and Tele...
Running  DispBrokerDeskt... Display Policy Service
Running  Dnscache           DNS Client
Running  DPS                Diagnostic Policy Service
Running  DsSvc              Data Sharing Service
Running  EventLog           Windows Event Log
Running  EventSystem        COM+ Event System
Running  FontCache          Windows Font Cache Service
Running  gpsvc              Group Policy Client
Running  iphlpsvc           IP Helper
Running  KeyIso             CNG Key Isolation
Running  LanmanServer       Server
Running  LanmanWorkstation  Workstation
Running  LicenseManager     Windows License Manager Service
Running  lmhosts            TCP/IP NetBIOS Helper
Running  LSM                Local Session Manager
Running  mpssvc             Windows Defender Firewall
Running  MSDTC              Distributed Transaction Coordinator
Running  NcbService         Network Connection Broker
Running  Netman             Network Connections
Running  netprofm           Network List Service
Running  NlaSvc             Network Location Awareness
```

## 4.2 Start and stop specific services.

1 Look for service spooler

**Get-Service -Name "Spooler"**

2 Stop a specific service (Spooler)

**Stop-Service -Name "Spooler"**

3 Start a specific service (Spooler)

**Start-Service -Name "Spooler"**

4 Stop a specific service (Spooler)

**Stop-Service -Name "Spooler"**

5 Restore and Retrieve information about the Spooler service

**Start-Service -Name "Spooler"**

### Get-Service -Name "Spooler"

```
PS C:\Users\Administrator\Documents> Get-Service -Name "Spooler"

Status   Name               DisplayName
------   ----               -----------
Running  Spooler            Print Spooler


PS C:\Users\Administrator\Documents> Stop-Service -Name "Spooler"
PS C:\Users\Administrator\Documents> Start-Service -Name "Spooler"
PS C:\Users\Administrator\Documents> Stop-Service -Name "Spooler"
PS C:\Users\Administrator\Documents> Start-Service -Name "Spooler"
PS C:\Users\Administrator\Documents> Get-Service -Name "Spooler"

Status   Name               DisplayName
------   ----               -----------
Running  Spooler            Print Spooler


PS C:\Users\Administrator\Documents>
```

## 4.3 Retrieve information about active processes.

Get-Process

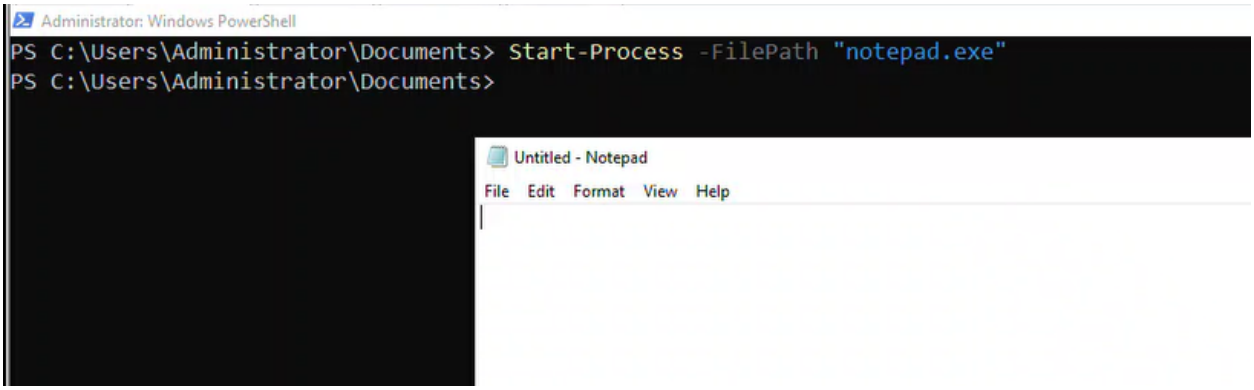
```
PS C:\Users\Administrator\Documents> Get-Process

Handles  NPM(K)    PM(K)      WS(K)     CPU(s)      Id  SI ProcessName
-------  ------    -----      -----     ------      --  -- -----------
     92       6      904       4744       0.02   3316   0 AggregatorHost
    258      15    13032      31692      22.48   5920   1 conhost
    511      22     2268       6560       2.38    472   0 csrss
    379      21     2312       7072      37.64    592   1 csrss
    410      16     3816      20772       0.55   5068   1 ctfmon
    237      18     3604      12912       0.19   2072   1 dllhost
    310      15     4092      14980       0.06   3424   0 dllhost
    857      38    32860      76360     116.22    456   1 dwm
   1673      65    30208     108728      12.81   1624   1 explorer
     40       9     3604       8440       0.16    880   1 fontdrvhost
     40       7     1376       4204       0.00    884   0 fontdrvhost
      0       0       60          8                  0   0 Idle
   1204      26     6836      20168       4.44    740   0 lsass
    215      14     2068       5460       0.08   4832   0 MicrosoftEdgeUpdate
    653      40    51984       9340      20.13   3944   1 mmc
    204      14     3536      14228       0.08   5104   0 MoUsoCoreWorker
    263      14     2940      11200       0.06   3632   0 msdtc
    614     224   259212     216560      11.20   2964   0 MsMpEng
    199      39     3728      11380       0.02   2348   0 NisSrv
   1450      72   280968     320180      22.91   4980   1 powershell
      0       8     2172      67004       0.63    124   0 Registry
    215      12     2200      13428       0.08    376   1 RuntimeBroker
    190      12     2520      16812       0.06    584   1 RuntimeBroker
    423      19     6588      27752       0.97    764   1 RuntimeBroker
    254      14     3232      21272       0.27   3336   1 RuntimeBroker
   1274      80    90272     149404       1.91   1500   1 SearchApp
    218      12     2360      15896       0.08    736   0 SecurityHealthService
    760      81   119524     144132      38.38   4448   1 ServerManager
    548      14     5504      10276       9.31    712   0 services
    622      28    11084      50132       0.22   4400   1 ShellExperienceHost
    526      17     5080      27952       1.50   4712   1 sihost
     57       4     1096       1260       0.08    344   0 smss
    480      23     6060      16928       0.11   6660   0 spoolsv
    566      29    17524      61448       0.94   2080   1 StartMenuExperienceHost
```

## 4.4 Terminate a process

Start-Process -FilePath "notepad.exe"

Get-Process | Where-Object { $_.Name -eq "notepad" }

Stop-Process -Name "notepad" -Force




```
PS C:\Users\Administrator\Documents> Start-Process -FilePath "notepad.exe"
PS C:\Users\Administrator\Documents> Get-Process | Where-Object { $_.Name -eq "notepad" }

Handles  NPM(K)    PM(K)      WS(K)     CPU(s)      Id  SI ProcessName
-------  ------    -----      -----     ------      --  -- -----------
    218      13     2484      17796       0.17    6564   1 notepad


PS C:\Users\Administrator\Documents> Stop-Process -Name "notepad" -Force
PS C:\Users\Administrator\Documents>
```

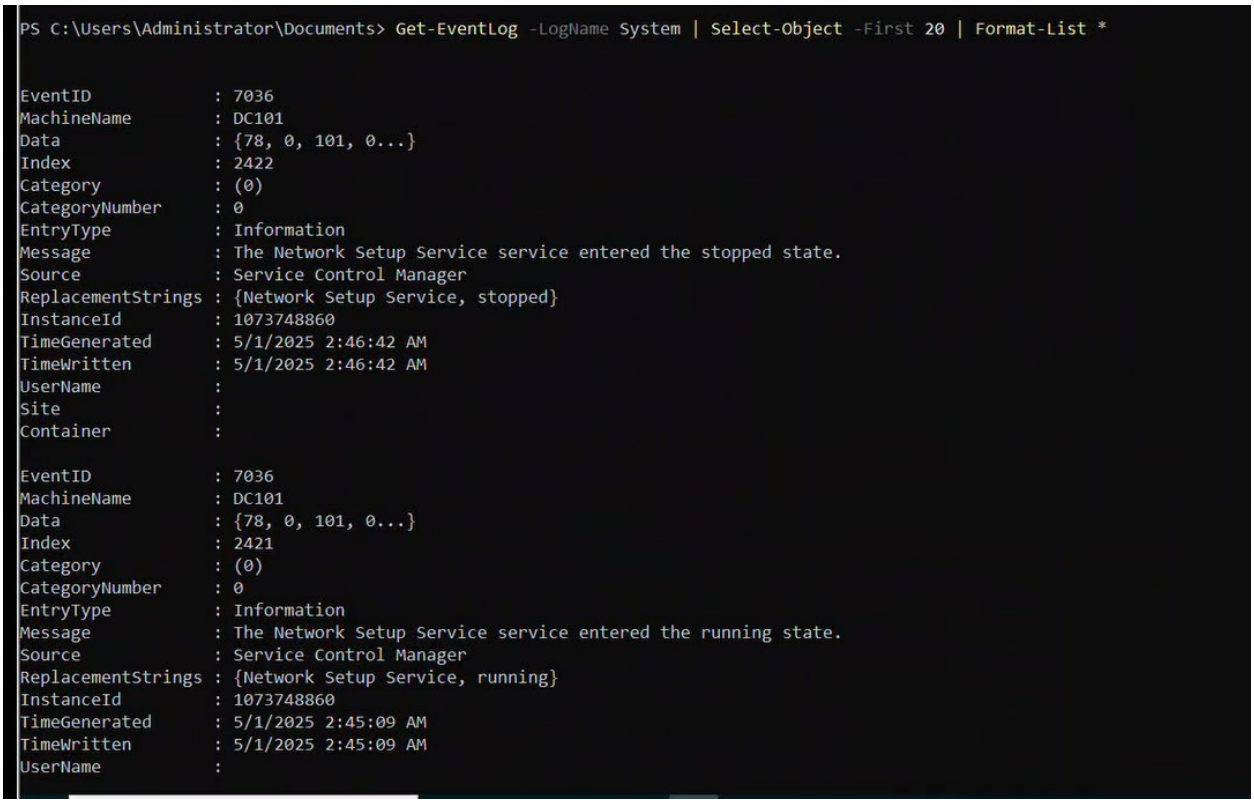
# 5 Task 5: Monitoring Event Logs and System Information

## 5.1 View the latest system event logs.

### Get-EventLog -LogName System -Newest 10

```
PS C:\Users\Administrator\Documents> Get-EventLog -LogName System -Newest 10

   Index Time          EntryType   Source                 InstanceID Message
   ----- ----          ---------   ------                 ---------- -------
    2421 May 01 02:45  Information Service Control M...   1073748860 The Network Setup Service service entered the running state.
    2420 May 01 02:39  Information Service Control M...   1073748860 The Network Setup Service service entered the stopped state.
    2419 May 01 02:35  Information Service Control M...   1073748860 The Network Setup Service service entered the running state.
    2418 May 01 02:34  Information Service Control M...   1073748860 The Device Setup Manager service entered the stopped state.
    2417 May 01 02:33  Information Service Control M...   1073748860 The Device Setup Manager service entered the running state.
    2416 May 01 02:31  Information Service Control M...   1073748860 The Print Spooler service entered the running state.
    2415 May 01 02:31  Information Service Control M...   1073748860 The Print Spooler service entered the stopped state.
    2414 May 01 02:31  Information Service Control M...   1073748860 The Print Spooler service entered the running state.
    2413 May 01 02:31  Information Service Control M...   1073748860 The Print Spooler service entered the stopped state.
    2412 May 01 02:26  Information Service Control M...   1073748860 The Network Setup Service service entered the stopped state.
```

**Get-EventLog -LogName System | Select-Object -First 20 | Format-List ***




## 5.2 Retrieve security event logs.

**Get-EventLog -LogName Security -Newest 10**

**Get-EventLog -LogName Security | Where-Object { $_.EventID -eq 4625 }**

** Event ID **4625** corresponds to **failed login attempts**

```
PS C:\Users\Administrator\Documents> Get-EventLog -LogName Security -Newest 10

   Index Time          EntryType   Source                 InstanceID Message
   ----- ----          ---------   ------                 ---------- -------
    1737 May 01 02:45  SuccessA... Microsoft-Windows...       4672 Special privileges assigned to new logon....
    1736 May 01 02:45  SuccessA... Microsoft-Windows...       4624 An account was successfully logged on....
    1735 May 01 02:35  SuccessA... Microsoft-Windows...       4672 Special privileges assigned to new logon....
    1734 May 01 02:35  SuccessA... Microsoft-Windows...       4624 An account was successfully logged on....
    1733 May 01 02:33  SuccessA... Microsoft-Windows...       4672 Special privileges assigned to new logon....
    1732 May 01 02:33  SuccessA... Microsoft-Windows...       4624 An account was successfully logged on....
    1731 May 01 02:31  SuccessA... Microsoft-Windows...       4672 Special privileges assigned to new logon....
    1730 May 01 02:31  SuccessA... Microsoft-Windows...       4624 An account was successfully logged on....
    1729 May 01 02:31  SuccessA... Microsoft-Windows...       4672 Special privileges assigned to new logon....
    1728 May 01 02:31  SuccessA... Microsoft-Windows...       4624 An account was successfully logged on....


PS C:\Users\Administrator\Documents> Get-EventLog -LogName Security | Where-Object { $_.EventID -eq 4625 }

   Index Time          EntryType   Source                 InstanceID Message
   ----- ----          ---------   ------                 ---------- -------
    1379 Apr 30 12:18  FailureA... Microsoft-Windows...       4625 An account failed to log on....


PS C:\Users\Administrator\Documents>
```

## 5.3 Extract operating system details using PowerShell.

This retrieves your **OS name, version, and architecture**

### Get-ComputerInfo | Select-Object WindowsProductName, WindowsVersion, OsArchitecture

```
PS C:\Users\Administrator\Documents> Get-ComputerInfo | Select-Object WindowsProductName, WindowsVersion, OsArchitecture

WindowsProductName             WindowsVersion OsArchitecture
------------------             -------------- --------------
Windows Server 2022 Datacenter 2009           64-bit


PS C:\Users\Administrator\Documents>
```

This shows **when your system was last restarted**

### (Get-CimInstance Win32_OperatingSystem).LastBootUpTime

```
PS C:\Users\Administrator\Documents> (Get-CimInstance Win32_OperatingSystem).LastBootUpTime

Tuesday, April 29, 2025 9:33:54 PM


PS C:\Users\Administrator\Documents>
```

```powershell
##########################################
## Task 1: Exploring PowerShell Commands
##########################################

### 1 Identify available PowerShell commands.
##########################################

# Identify available  commands.
Get-Command

# Filtering Commands
#List only cmdlets:
Get-Command -CommandType Cmdlet
#Find commands related to networking:
Get-Command -Name *Net*

#Discover commands for remote sessions:
Get-Command -Name *PSSession*

###2. Retrieve detailed help for a specific command.
#####################################################

### Get Help on a Specific Command
# Get-Help <Cmdlet-Name> -Detailed
Get-Help Get-NetAdapter -Detailed

# See examples, use:
Get-Help Get-NetAdapter -Examples

#Get full documentation, including parameters and descriptions:
Get-Help Get-NetAdapter -Full

# Get the absolute most detailed version:
Get-Help Get-NetAdapter -Online


## 3. Retrieve detailed help for a specific command.
#####################################################

## To list all properties and methods of an object in , use the `Get-Member` cmdlet:

### Basic Syntax
Get-Service | Get-Member

# This lists all methods and properties of objects returned by `Get-Service`.

### Inspect a Specific Object
# To check properties and methods for a specific object, use:
$object = Get-NetAdapter
$object | Get-Member

### Filtering for Only Properties or Methods
# List only properties:
  $object | Get-Member -MemberType Property

# List only methods:
  $object | Get-Member -MemberType Method

##########################################
##  Task 2: Working with Objects
##########################################

### 1. Display process information in table and list formats.
#############################################################

### Table Format (Structured View)
```

```
### Use the `Format-Table` cmdlet for a neatly organized table:
Get-Process | Format-Table -AutoSize

##`-AutoSize` ensures columns adjust for readability.

### List Format (Detailed View)
## Use `Format-List` to display processes in a detailed list format:
Get-Process | Format-List


### Custom Table View
## If you only need specific details (like process name & ID), format the table like this:
Get-Process | Format-Table Name, Id, CPU, MemoryUsage -AutoSize


### Custom List View
## For a refined list format with selected properties:
Get-Process | Format-List Name, Id, CPU, MemoryUsage


### 2. Sort processes based on CPU usage.
#################################################################
# To sort processes by CPU usage in PowerShell, use the following command:
  Get-Process | Sort-Object -Property CPU -Descending

#`Sort-Object -Descending`** ensures processes with the highest CPU usage appear at the top.

### Additional Customization
# If you want a table view for better readability:
  Get-Process | Sort-Object -Property CPU -Descending | Format-Table -AutoSize

# To show **only specific properties** (like Name, ID, and CPU usage):
  Get-Process | Sort-Object -Property CPU -Descending | Select-Object Name, Id, CPU |
  Format-Table -AutoSize


## 3. Select and filter objects based on specific conditions.
#################################################################
### Select Specific Properties
## If you want to display only certain attributes of an object, use:
Get-Process | Select-Object Name, Id, CPU

# This will show only the Name, ID, and CPU usage of each process.

### Filter Objects Based on a Condition
# If you need to filter objects, use `Where-Object`. For example, to list processes consuming
**more than 50% CPU, run:
Get-Process | Where-Object { $_.CPU -gt 50 }

### Filter Objects Using Multiple Conditions
## To filter objects using multiple conditions, for example, selecting processes with CPU > 50
AND Memory usage > 100MB, use:
Get-Process | Where-Object { $_.CPU -gt 50 -and $_.WS -gt 100 }

### Select Top N Results
## If you want only the top 5 highest CPU-consuming processes, use:
Get-Process | Sort-Object -Property CPU -Descending | Select-Object -First 5


### 4. Loop through system objects and extract specific information.
#################################################################
# To loop through system objects and extract specific information in PowerShell, use a
`ForEach-Object` loop or a `foreach` statement.

### Using `ForEach-Object` (Pipeline)
# You can iterate over objects in a pipeline and extract specific properties. For example,
```

```
listing all **running processes** with their **name and CPU usage**:
Get-Process | ForEach-Object { "$($_.Name) - CPU: $($_.CPU)" }

### Using a `foreach` Loop
For more control, store the objects in a variable and loop through them:
$processes = Get-Process
foreach ($process in $processes) {
    Write-Host "Process: $($process.Name) - ID: $($process.Id) - CPU: $($process.CPU)"
}

### Loop Through Services and Extract Specific Details
# To list services that are **running**, with their **status and display name**:
Get-Service | Where-Object { $_.Status -eq "Running" } | ForEach-Object { "$($_.DisplayName) -
Status: $($_.Status)" }

##########################################
## Task 3: Managing the File System
##########################################

## 1. Navigate through directories and list files
################################################

### Change Directory (`cd` or `Set-Location`)

# To move into a different directory:
Set-Location C:\Users\Administrator\Documents

# or simply:

cd C:\Users\Administrator\Documents


### 2 List Files in a Directory (`Get-ChildItem`)
# To display files and folders in the current directory:
Get-ChildItem
# or specify a directory:
Get-ChildItem C:\Users\Administrator\

### 3 Show Only Files (Exclude Folders)
# To list only files, excluding directories:
Get-ChildItem -File


### 4 Show Only Folders (Exclude Files)
# To list only directories, excluding files:
Get-ChildItem -Directory


### 5 List Files with Specific Extensions
# To find only *.dll files, for example:
Get-ChildItem -Path 'C:\Program Files\Common Files\System\' -Filter *.dll

### 6. Navigate Back to Previous Directory
# To return to the previous directory:

cd ..
# or
Set-Location ..

## 2 Create and delete files and folders
########################################

### Create a New File
New-Item -Path "C:\Users\Administrator\Documents\example.txt" -ItemType File

### Create a New Folder
```

```
New-Item -Path "C:\Users\Administrator\Documents\NewFolder" -ItemType Directory

### Delete a File
## To remove a file:
Remove-Item -Path "C:\Users\Administrator\Documents\example.txt"
## Add `-Force` to bypass confirmation if needed.

### Delete a Folder
## To remove an **empty** folder:
Remove-Item -Path "C:\Users\Administrator\Documents\NewFolder"

## To delete a folder with contents, use:
Remove-Item -Path "C:\Users\Administrator\Documents\NewFolder" -Recurse -Force


## 3 Copy and move files between locations.
##########################################
#3.3.1  Prepare
#1. Create a new folder called "SourceFolder" inside C:\Users\Administrator\Documents
New-Item -Path "C:\Users\Administrator\Documents\SourceFolder" -ItemType Directory
# This ensures the directory exists before copying or moving files.
#2. Create a New File
#Create a new text file inside SourceFolder
New-Item -Path "C:\Users\Administrator\Documents\SourceFolder\example.txt" -ItemType File
#This creates an empty file that can later be edited or copied.

#3. This creates an empty file that can later be edited or copied.
# create destination Folder
New-Item -Path "C:\Users\Administrator\Documents\DestinationFolder" -ItemType Directory



#4. This creates an empty folder that can later be copied or moved
New-Item -Path "C:\Users\Administrator\Documents\OldFolder"

##
## Copy
##
#3.3.2   Copy a File
#Copy example.txt from SourceFolder to DestinationFolder
Copy-Item -Path "C:\Users\Administrator\Documents\SourceFolder\example.txt" -Destination
"C:\Users\Administrator\Documents\DestinationFolder\example.txt"
#The file remains in SourceFolder while being duplicated in DestinationFolder.


#3.3.3  Copy an Entire Folder
#Copy SourceFolder and all its contents to BackupFolder
Copy-Item -Path "C:\Users\Administrator\Documents\SourceFolder" -Destination
"C:\Users\Administrator\Documents\BackupFolder" -Recurse
#The `-Recurse` flag ensures that all files and subfolders are copied.

##
## Move
##
#3.3.4  Move a File
#Move example.txt from SourceFolder to DestinationFolder
Move-Item -Path "C:\Users\Administrator\Documents\SourceFolder\example.txt" -Destination
"C:\Users\Administrator\Documents\DestinationFolder\example.txt" -Force
# Unlike copying, this removes the file from SourceFolder and places it in DestinationFolder.


#3.3.5  Move an Entire Folder
#Move OldFolder and all contents into NewFolder
Move-Item -Path "C:\Users\Administrator\Documents\OldFolder" -Destination
"C:\Users\Administrator\Documents\NewFolder"
```

```powershell
#The folder and its files will be transferred, leaving OldFolder empty or deleted.

#3.3.6  Restore
#1. Delete a File
#Delete example.txt from DestinationFolder
Remove-Item -Path "C:\Users\Administrator\Documents\DestinationFolder\example.txt"

# Use `-Force` if you want to delete without confirmation.


#2. Delete a Folder (With Contents)
# Delete BackupFolder and all its files
Remove-Item -Path "C:\Users\Administrator\Documents\DestinationFolder\example.txt"
Remove-Item -Path "C:\Users\Administrator\Documents\BackupFolder" -Recurse -Force
Remove-Item -Path "C:\Users\Administrator\Documents\NewFolder" -Recurse -Force
Remove-Item -Path "C:\Users\Administrator\Documents\DestinationFolder" -Recurse -Force
Remove-Item -Path "C:\Users\Administrator\Documents\SourceFolder" -Recurse -Force
#This permanently removes used files and folders

## 4    Check available disk space.
##############################################
# Get available disk space for the C: drive
Get-PSDrive C

# Retrieve detailed volume information, including free space
Get-Volume | Select-Object DriveLetter, SizeRemaining, Size

##############################################
##Task 4: Managing System Services and Processes
##############################################

#1. List all running services on the system.
Get-Service | Where-Object { $_.Status -eq "Running" }

# 2.    Start and stop specific services.
# Look for service spooler
Get-Service -Name "Spooler"
# Stop a specific service (Spooler)
Stop-Service -Name "Spooler"
# Start a specific service (Spooler)
Start-Service -Name "Spooler"

# Stop a specific service (Spooler)
Stop-Service -Name "Spooler"

# Restore and Retrieve information about the Spooler service
Start-Service -Name "Spooler"
Get-Service -Name "Spooler"

#3. Retrieve information about active processes.
Get-Service -Name "Spooler"
Get-Process | Select-Object Name, Id, CPU, WorkingSet
#4. Terminate a process.

Start-Process -FilePath "notepad.exe"
Get-Process | Where-Object { $_.Name -eq "notepad" }
Stop-Process -Name "notepad" -Force

#########################################################
#Task 5: Monitoring Event Logs and System Information
#########################################################
# 1 View the latest system event logs.
Get-EventLog -LogName System -Newest 10
Get-EventLog -LogName System | Select-Object -First 20 | Format-List *
#2  Retrieve security event logs.
Get-EventLog -LogName Security -Newest 10
```

```powershell
Get-EventLog -LogName Security | Where-Object { $_.EventID -eq 4625 }
## Event ID 4625 corresponds to failed login attempts

## 3    Extract operating system details using PowerShell.

# This retrieves your OS name, version, and architecture

Get-ComputerInfo | Select-Object WindowsProductName, WindowsVersion, OsArchitecture

# This shows when your system was last restarted
(Get-CimInstance Win32_OperatingSystem).LastBootUpTime
```