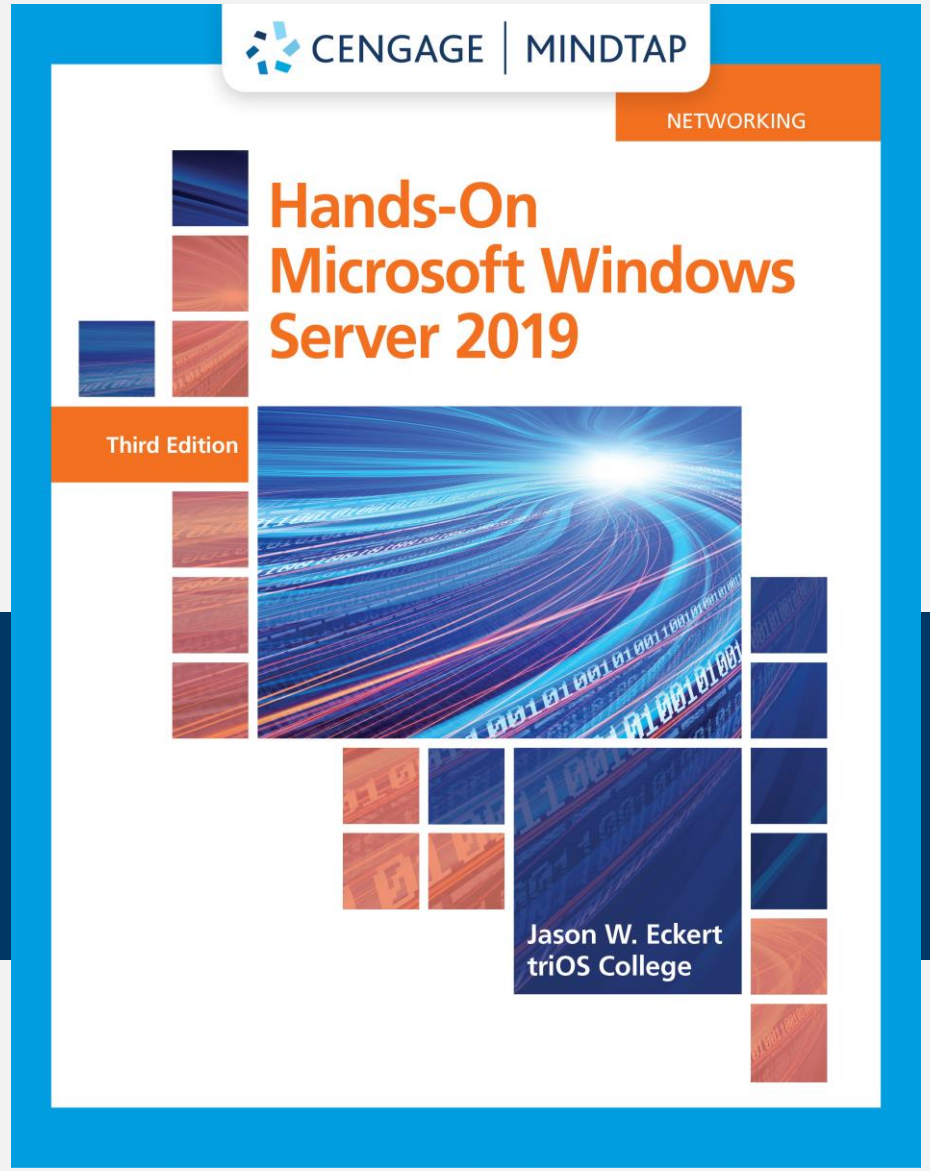

Configuring Windows Server 2019

Module 2

Learning Objectives (1 of 2)

After completing this module you should be able to:

- Use Server Manager to monitor and manage Windows Server systems
- Install and use the Windows Admin Center to monitor and manage Windows Server systems
- Configure server hardware devices
- Use the System File Checker and Sigverif to verify system files

Learning Objectives (2 of 2)

After completing this module you should be able to:

- Configure key Windows Server components within Control Panel and Device Manager
- Explain the purpose and configuration of the Windows Registry
- Identify the components, features, and usage of Windows PowerShell
- Use Windows PowerShell to manage a server
- Create PowerShell scripts for systems administration

Working with Server Manager (1 of 10)

- Used to monitor and manage several different Windows Server systems
- Server Manager Dashboard panes
  - Dashboard section at the top
  - Welcome to Server Manager pane (often hidden by administrators)
  - Roles and Server Groups pane
- Dashboard uses various colors and icons
- Additional Server Manager panes
  - Events, Services, Best Practices Analyzer, Performance, Roles and Features

Working with Server Manager (2 of 10)

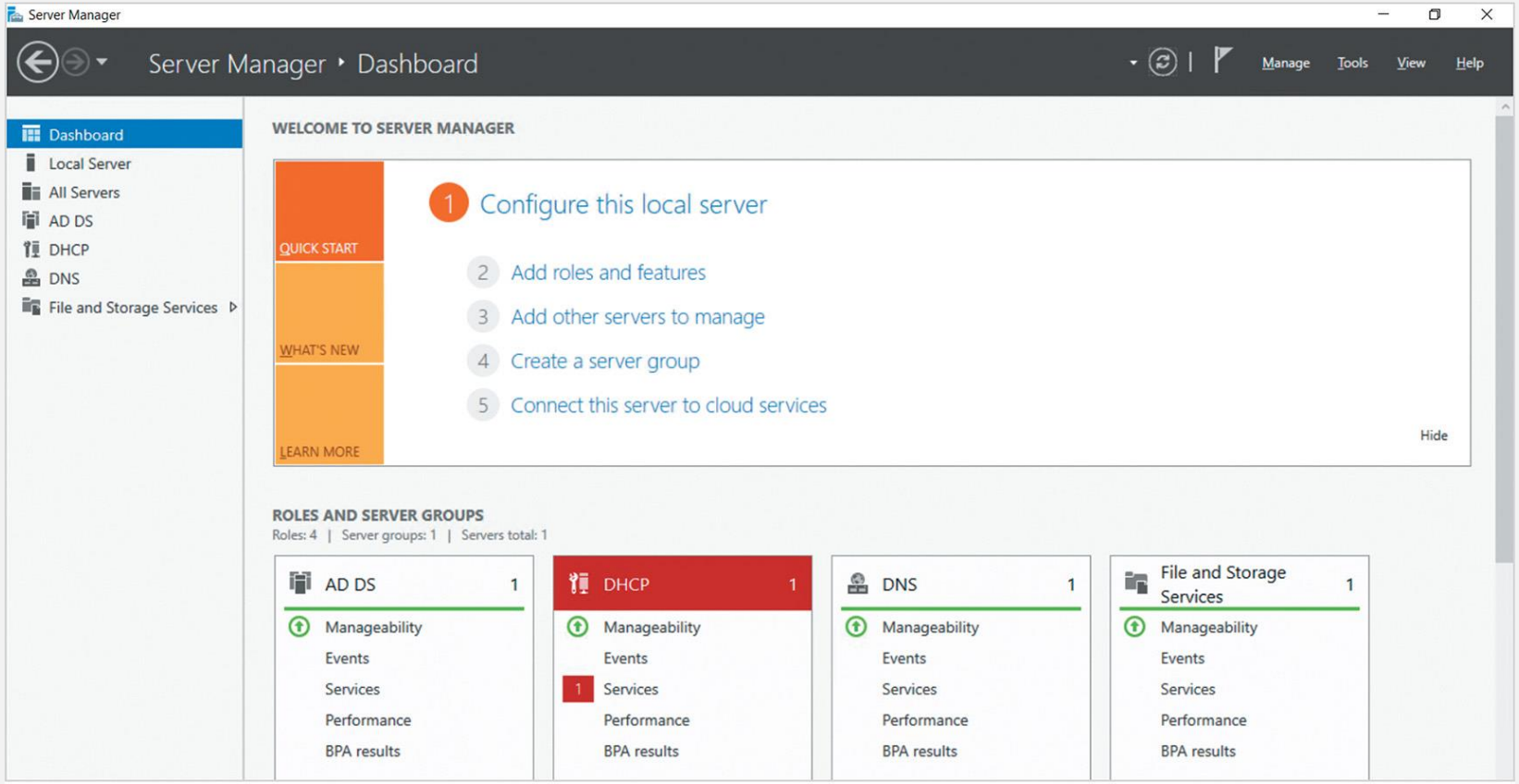

Figure 2-1 Managing servers and roles within Server Manager

Working with Server Manager (3 of 10)

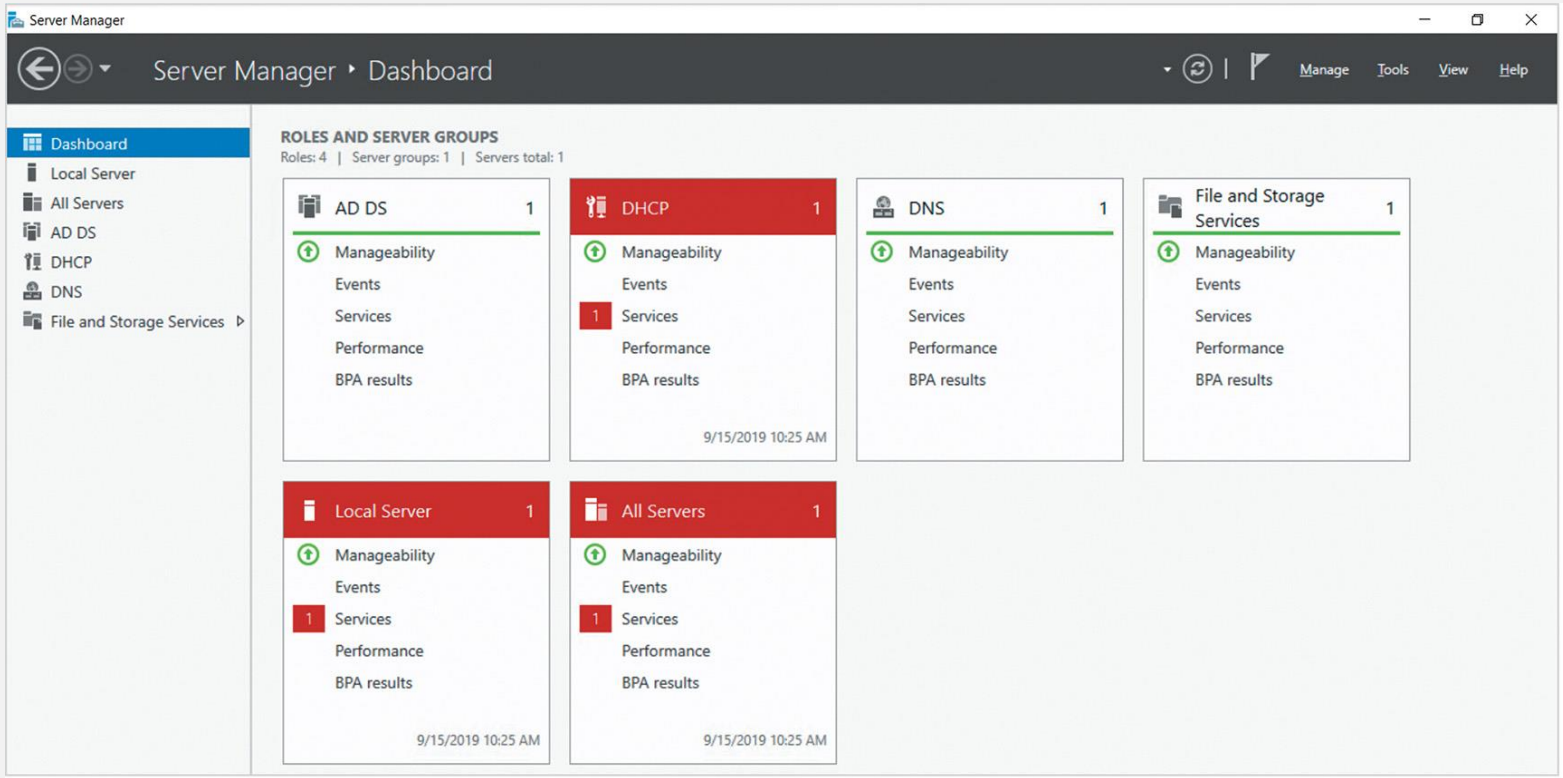

Figure 2-2 Viewing the status of roles and servers within Server Manager

Working with Server Manager (4 of 10)

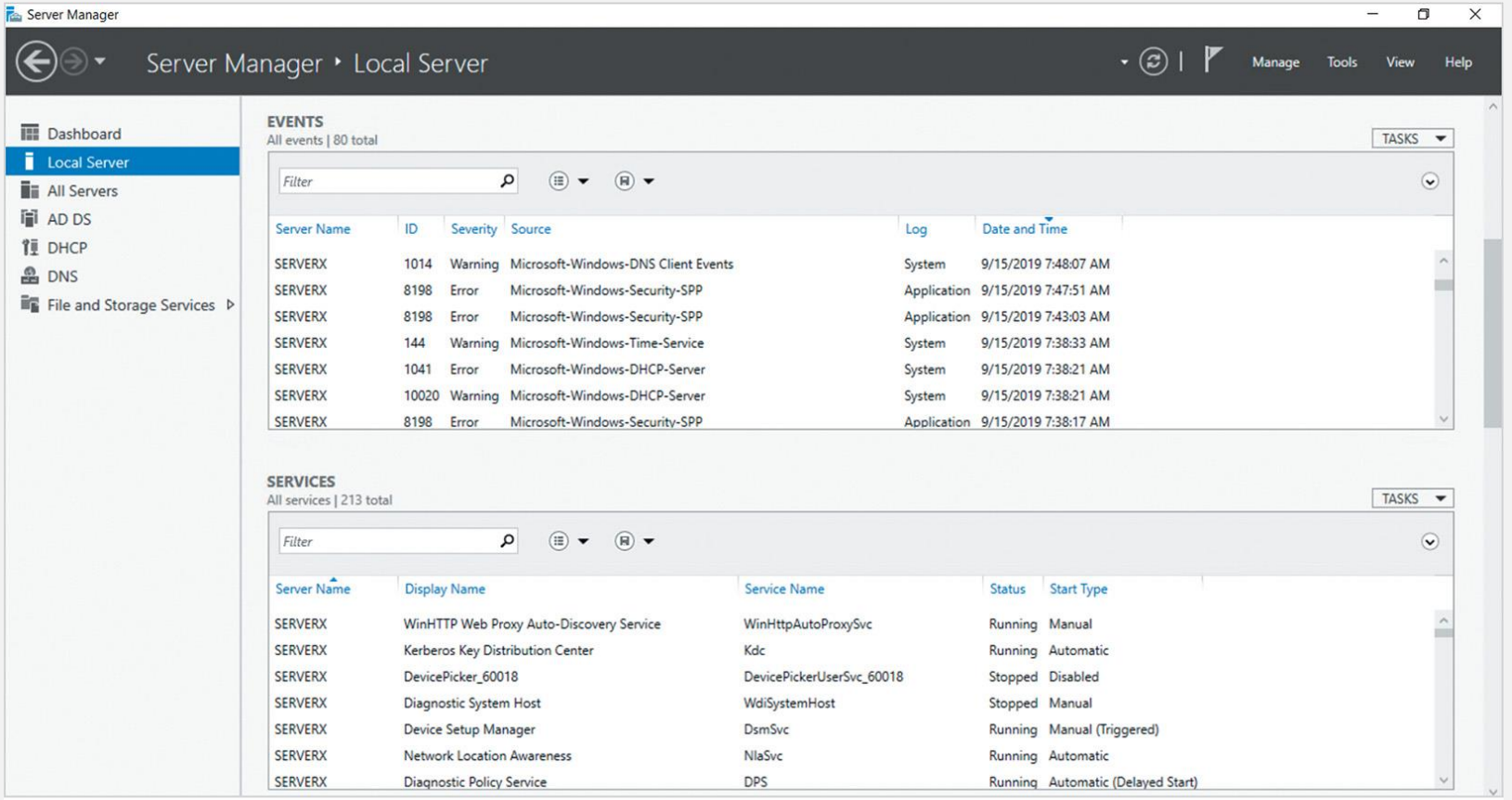

Figure 2-3 Viewing events and services for the local server within Server Manager

Working with Server Manager (5 of 10)

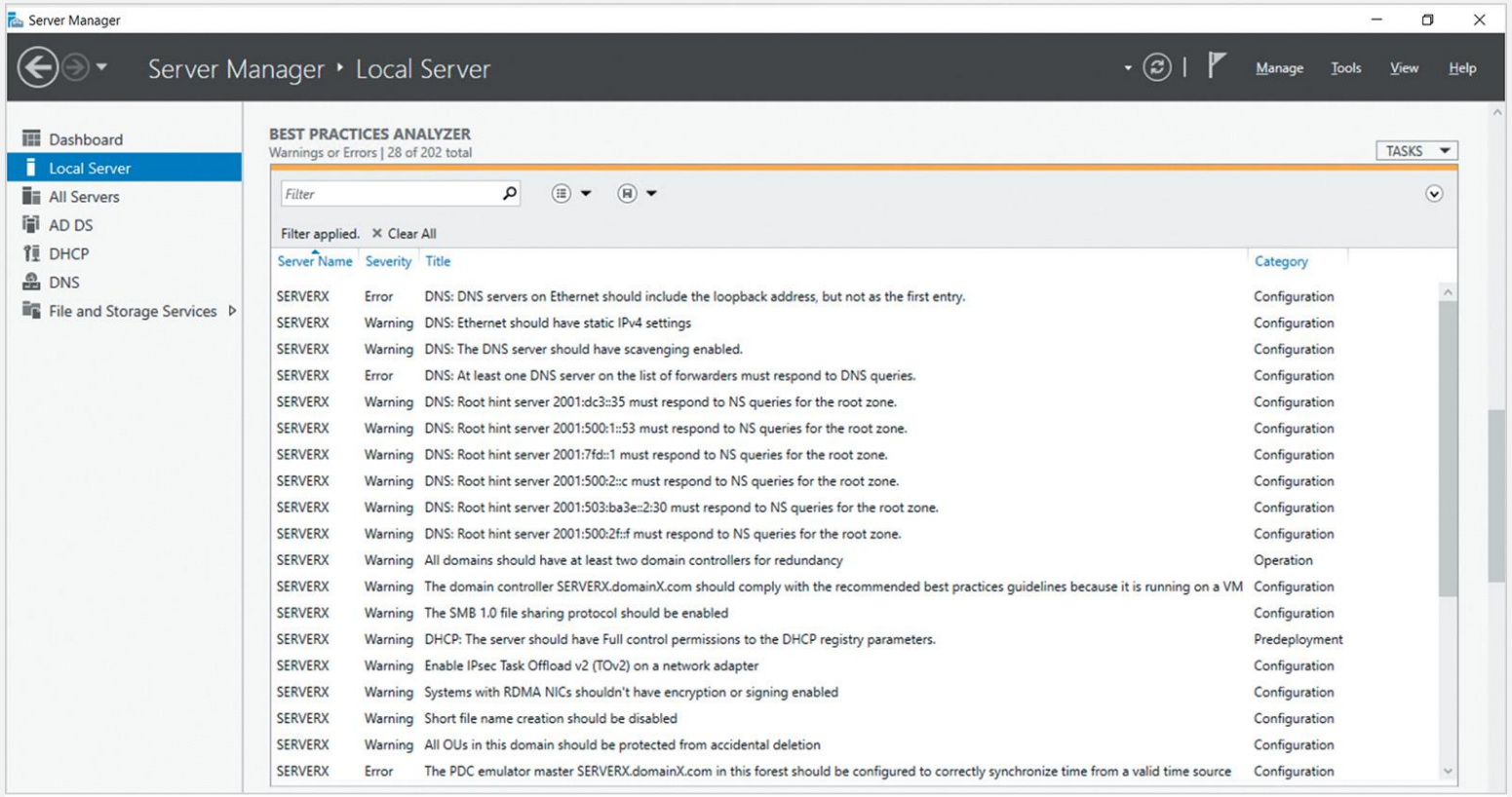

Figure 2-5 Viewing Best Practices Analyzer information for the local server within Server Manager

Working with Server Manager (6 of 10)

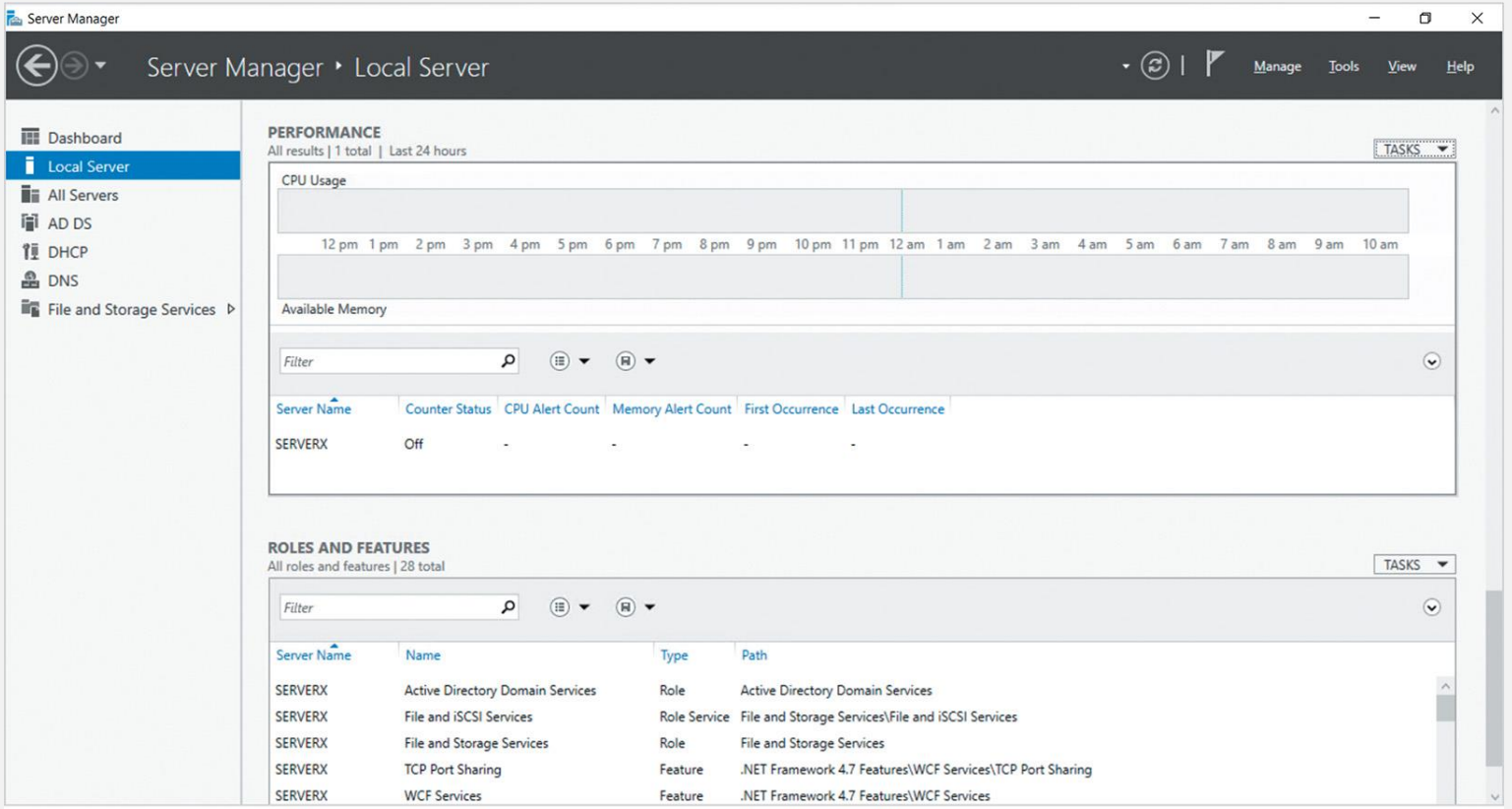

Figure 2-6 Viewing performance and role information for the local server within Server Manager

Working with Server Manager (7 of 10)

- Server roles introduced starting with Windows Server 2012
  - Have configuration tools built into the Server Manager interface
  - Example: Storage Spaces
- Some server roles have their own MMC tool for configuration
- Starting an MMC tool
  - Navigate to a server group or role section within the navigation area
  - Right-click a server in the Servers pane and choose the appropriate tool
  - Example: DHCP server role

Working with Server Manager (8 of 10)

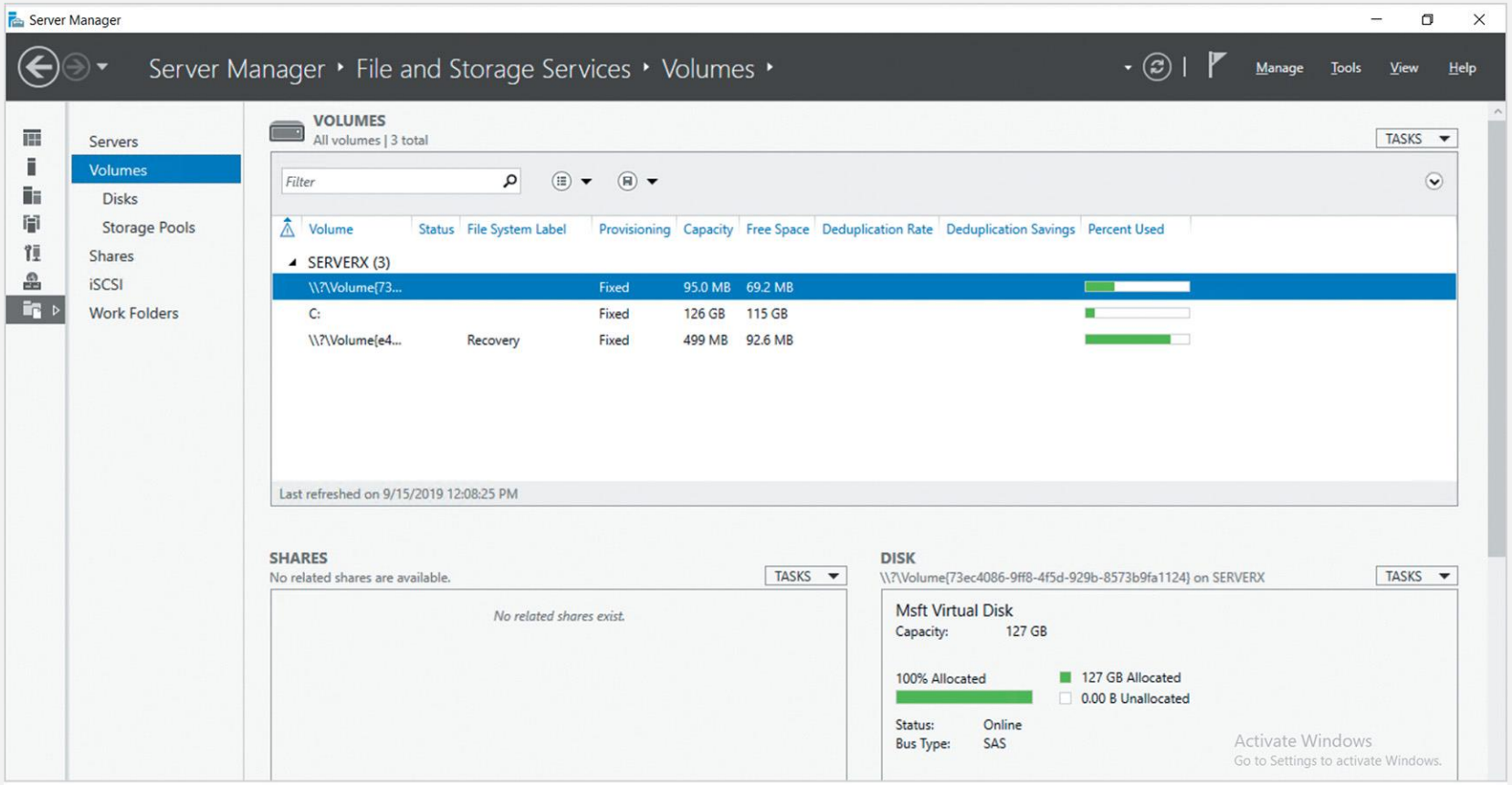

Figure 2-9 Configuring Storage Spaces from within Server Manager

Working with Server Manager (9 of 10)

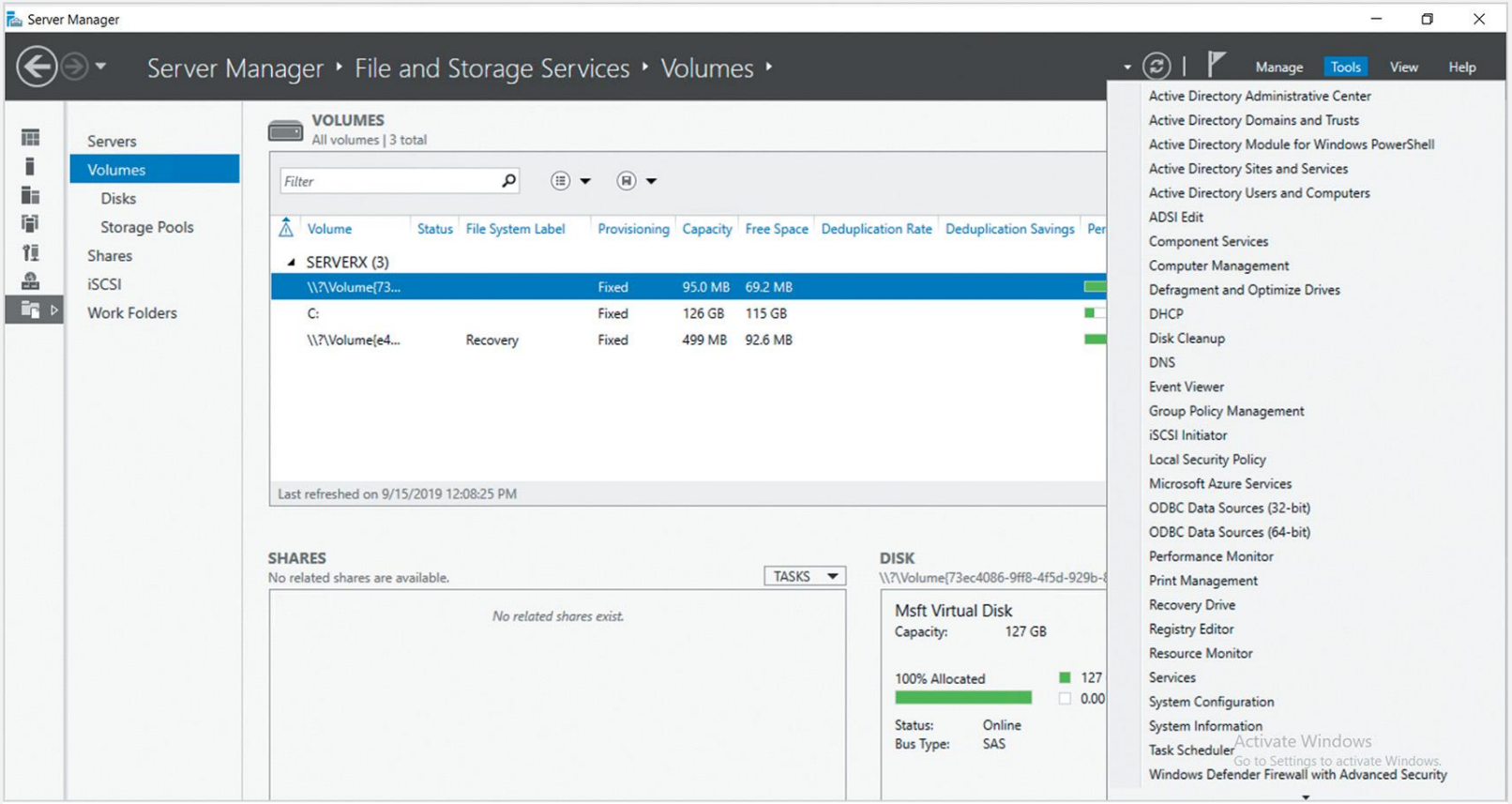

Figure 2-10 The Server Manager Tools menu

Working with Server Manager (10 of 10)

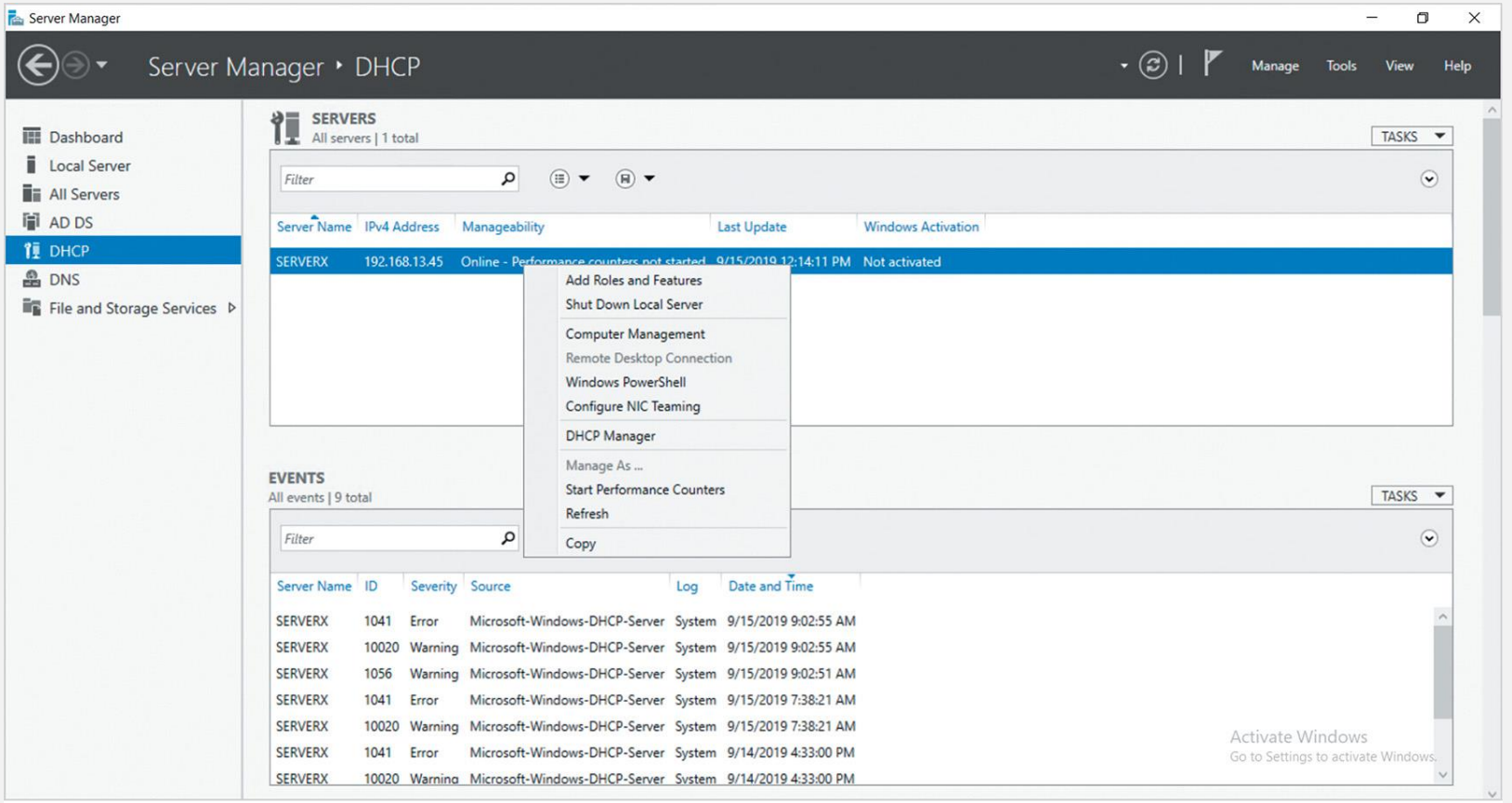

Figure 2-11 The right-click menu for a server within Server Manager

Adding Roles and Features Using Server Manager (1 of 7)

- Three different ways to add roles and features within Server Manager
  - Selecting Add roles and features from the Welcome to Server Manager pane within the Dashboard section
  - Selecting Add Roles and Features from the Manage menu
  - Selecting Add Roles and Features from the Tasks menu within the Roles and Features pane for a server or server role
- Starting the installation of a role is the same for all three methods
  - Use the Add Roles and Features Wizard

Adding Roles and Features Using Server Manager (2 of 7)

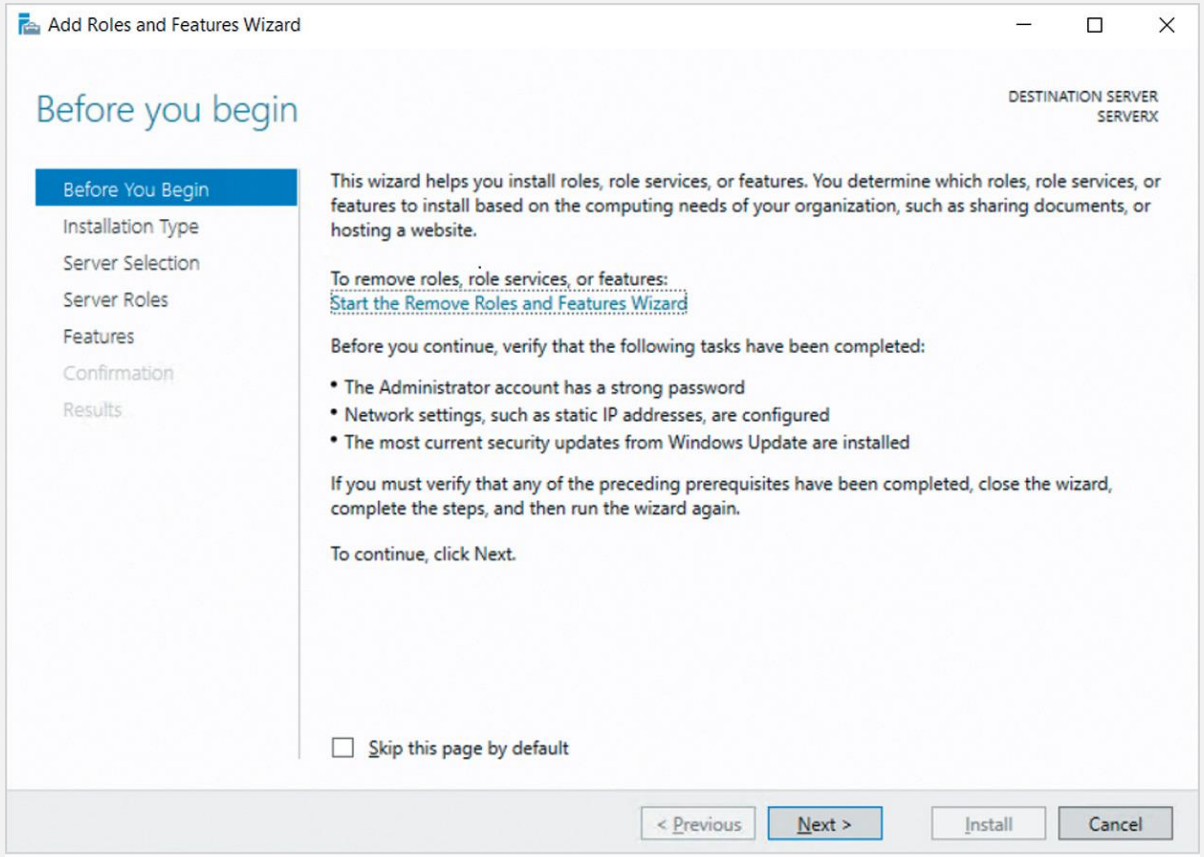

Figure 2-12 The Add Roles and Features Wizard

Adding Roles and Features Using Server Manager (3 of 7)

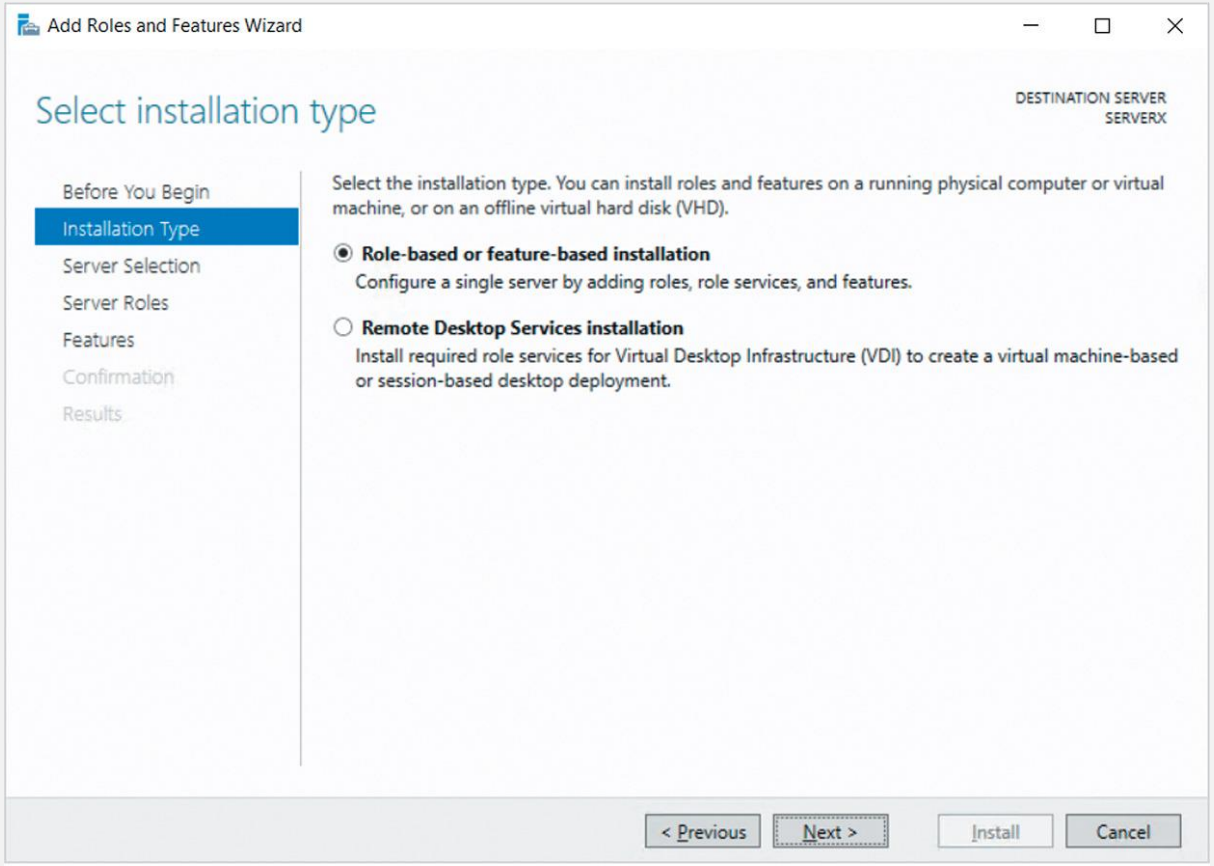

Figure 2-13 Selecting the installation type

Adding Roles and Features Using Server Manager (4 of 7)

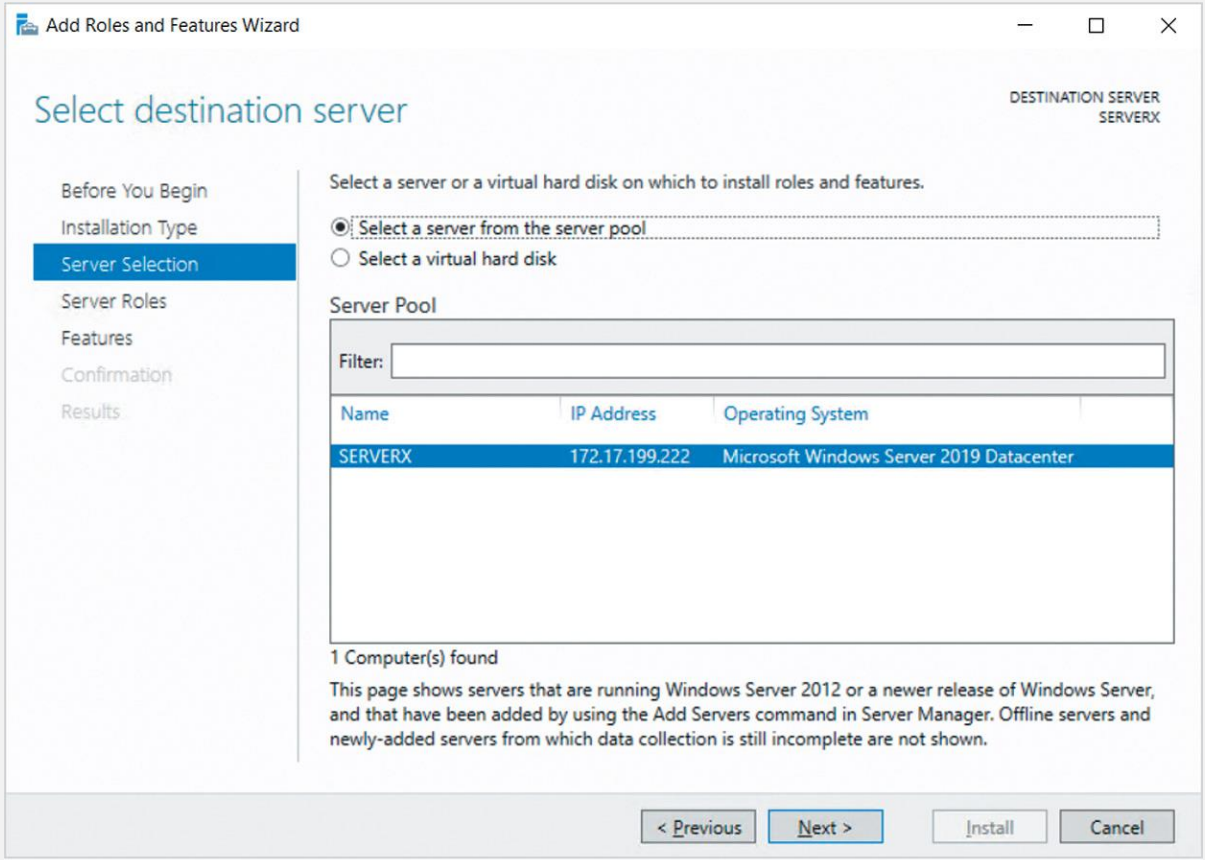

Figure 2-14 Selecting the destination server

Adding Roles and Features Using Server Manager (5 of 7)

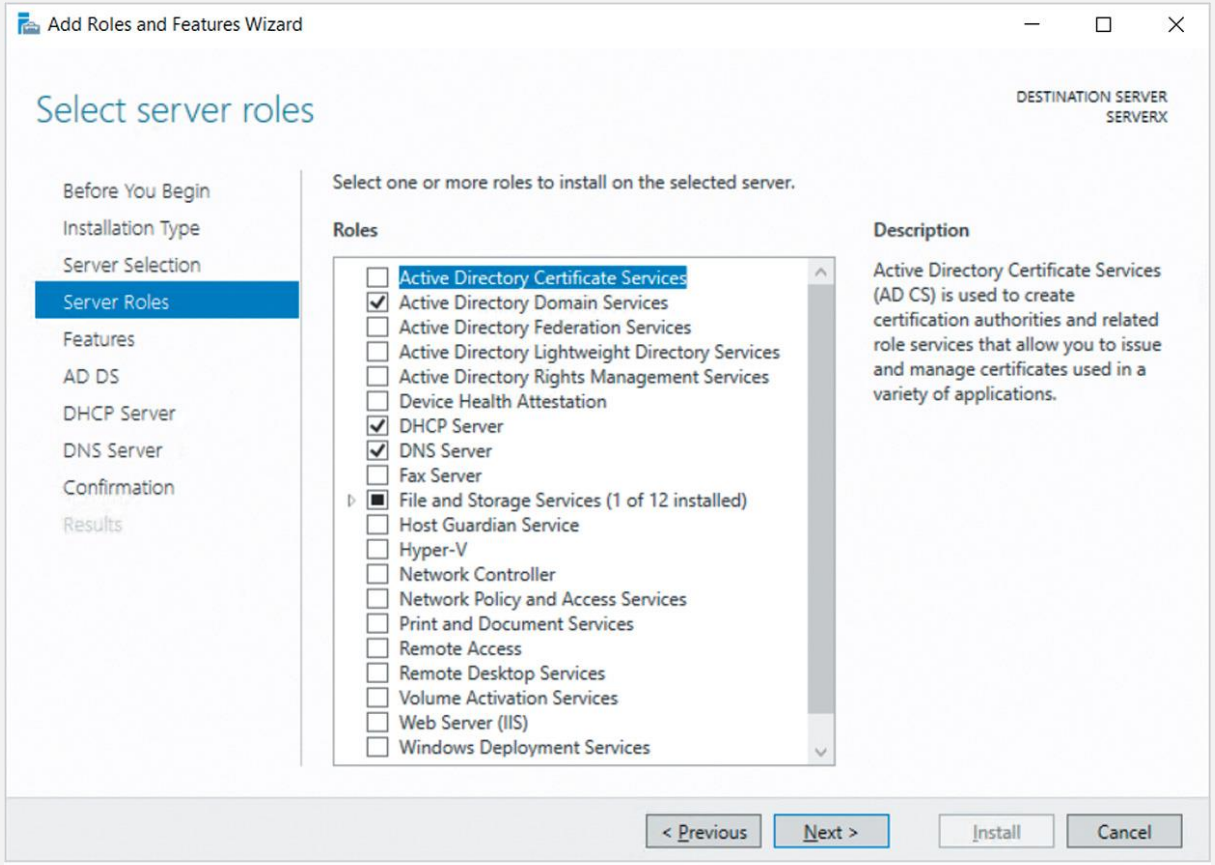

Figure 2-15 Selecting server roles

Adding Roles and Features Using Server Manager (6 of 7)

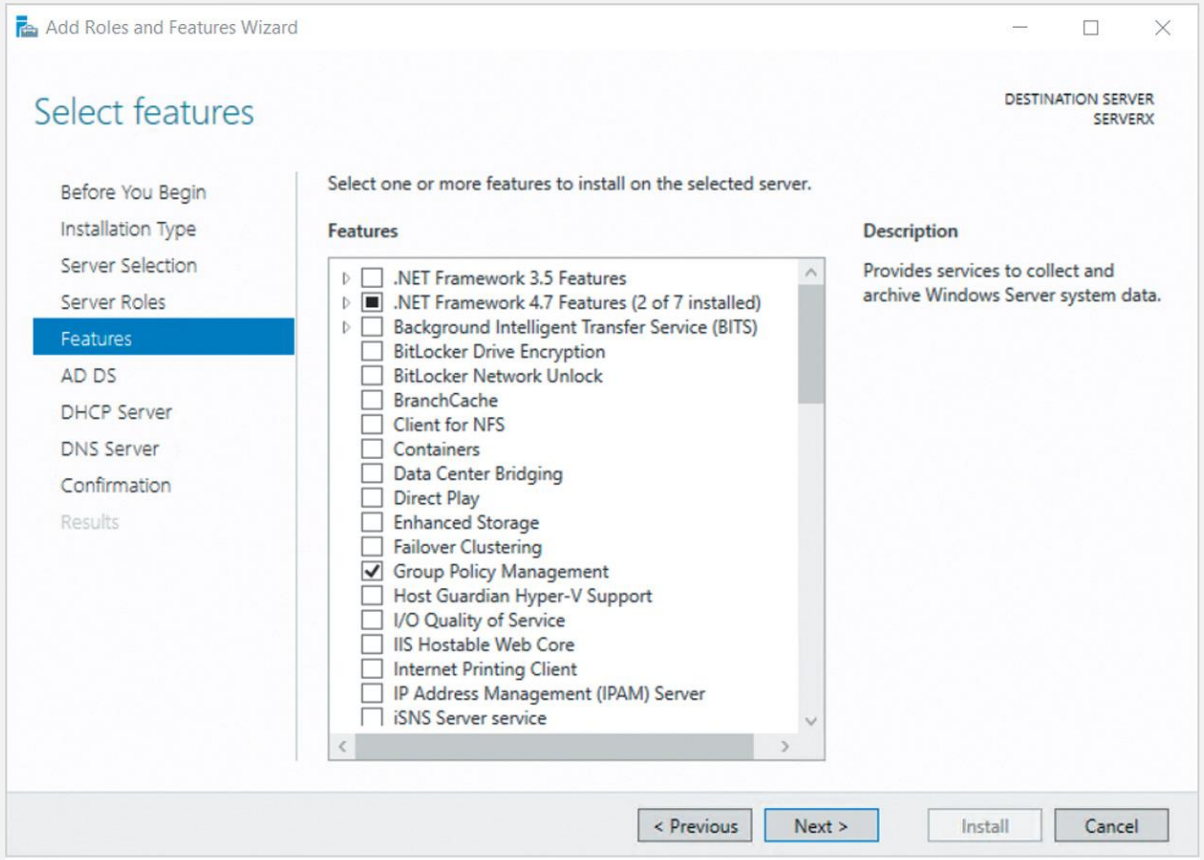

Figure 2-16 Selecting features

Adding Roles and Features Using Server Manager (7 of 7)

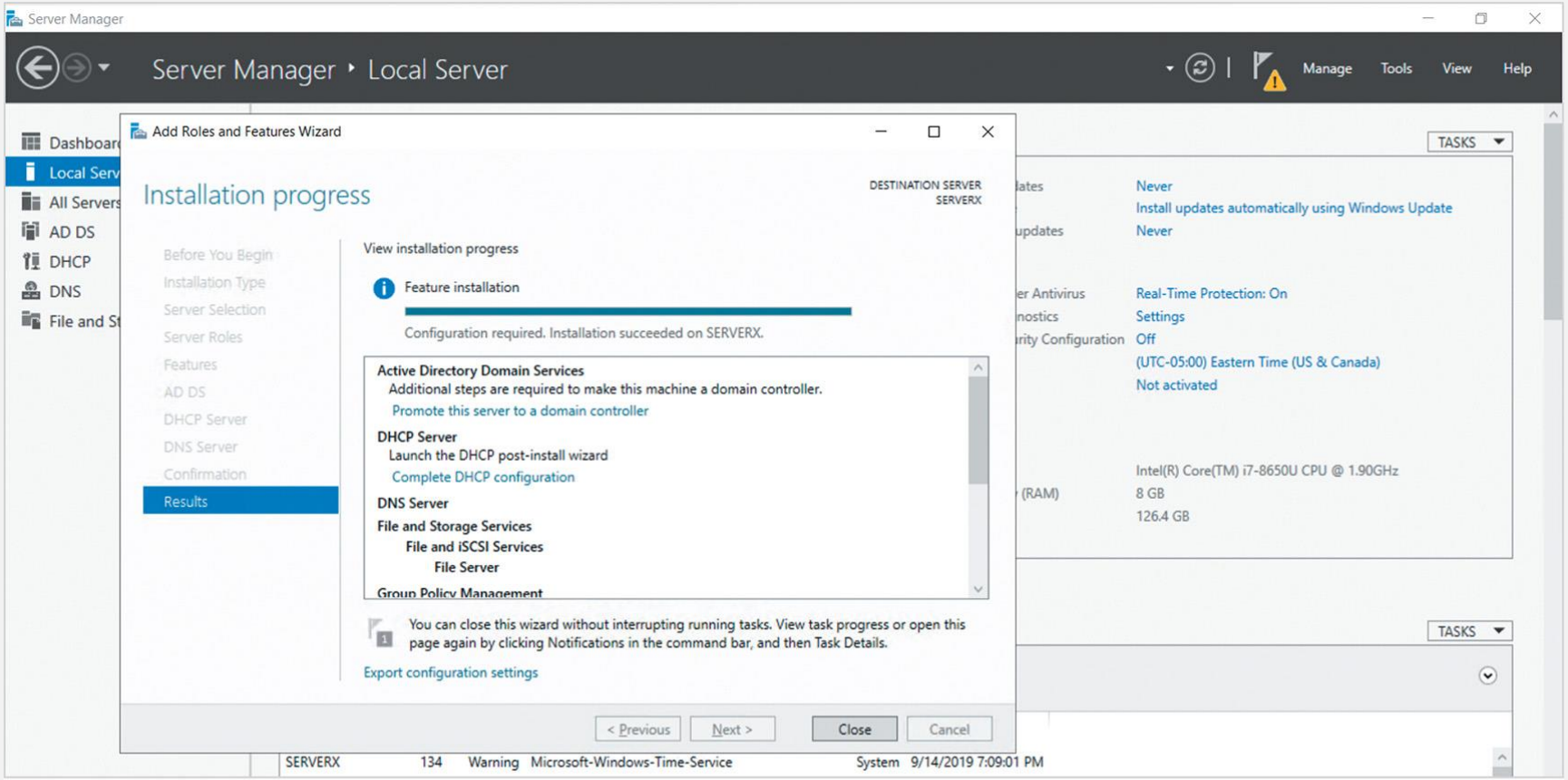

Figure 2-17 Completing the installation of roles and features

Using the BPA to Verify Server Roles

- BPA scan
  - Determines if role configuration meets Microsoft minimum guidelines
  - Scan results indicate security level and category for recommendations
- Levels of severity
  - Information, warning, error
- Categories for BPA recommendations
  - Configuration, predeployment, postdeployment, performance, BPA prerequisites

Working with the Windows Admin Center

- Server Manager disadvantage
  - Needs to connect to Windows Server system to run it
  - Need to install the RSAT on a Windows 10 PC
- Windows Admin Center
  - Relatively new tool
  - Remotely manage Windows Server 2019 using a modern Web browser
  - Preferred if hosting large numbers of remote Windows Server systems
  - Boasts a wide range of monitoring and management functionality

Installing the Windows Admin Center (1 of 2)

- Download the desired version (preview or regular)
- Start the installer; navigate through several screens, clicking Next each time
  - Accept license
  - Automatically update the Windows Admin Center
  - Prompt for function capabilities in different scenarios
  - Prompt to modify local computer's trusted host settings
  - Prompt on how to generate encryption certificate
- URL to access Admin Center displayed on final screen

Installing the Windows Admin Center (2 of 2)

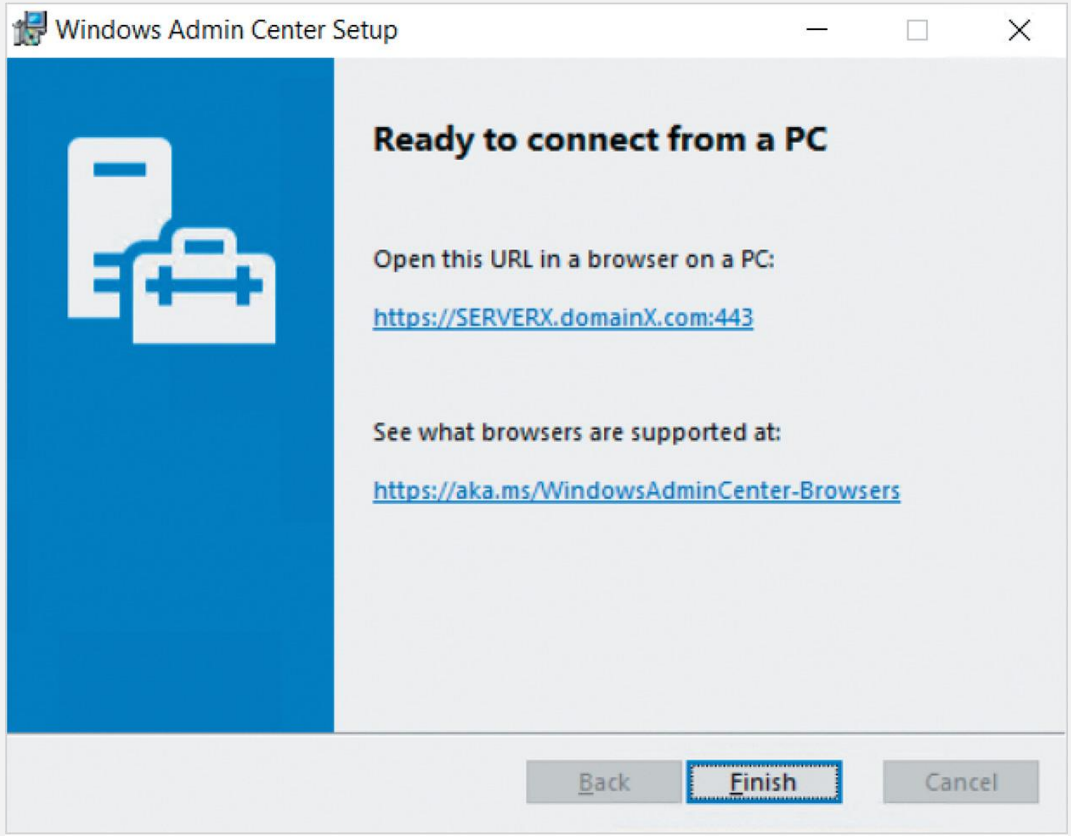

Figure 2-20 Completing the installation of the Windows Admin Center

Using the Windows Admin Center (1 of 3)

- First use requires log-in with valid credentials
  - Prompted to complete a quick tour
- Placed at the connections screen within the Windows Admin Center
  - Can manage server hosting the Windows Admin Center
  - Can add Windows Server 2012 and later systems and edit tags
- Many similarities to Server Manager
- Many tools within the navigation pane
  - Configuration, remote access, Azure cloud integration

Using the Windows Admin Center (2 of 3)

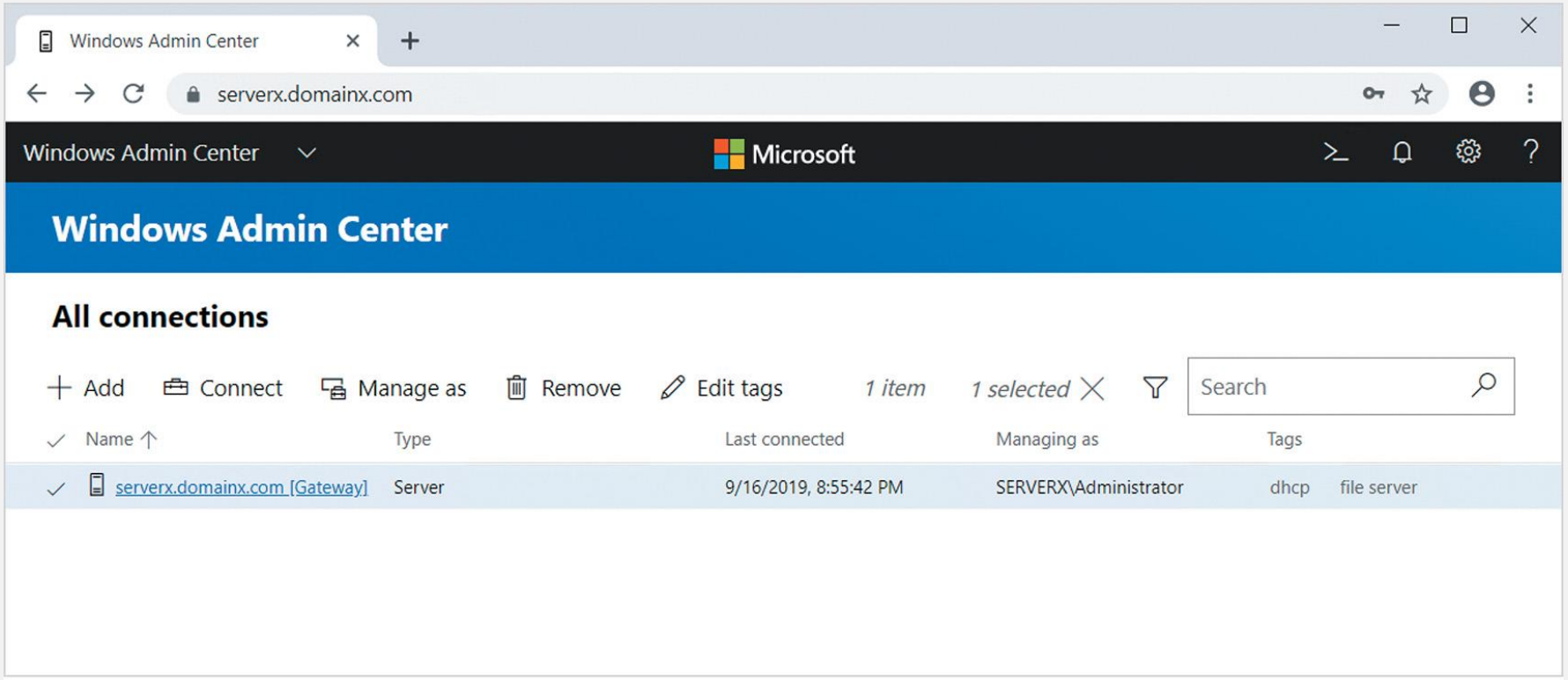

Figure 2-21 The Windows Admin Center

Using the Windows Admin Center (3 of 3)

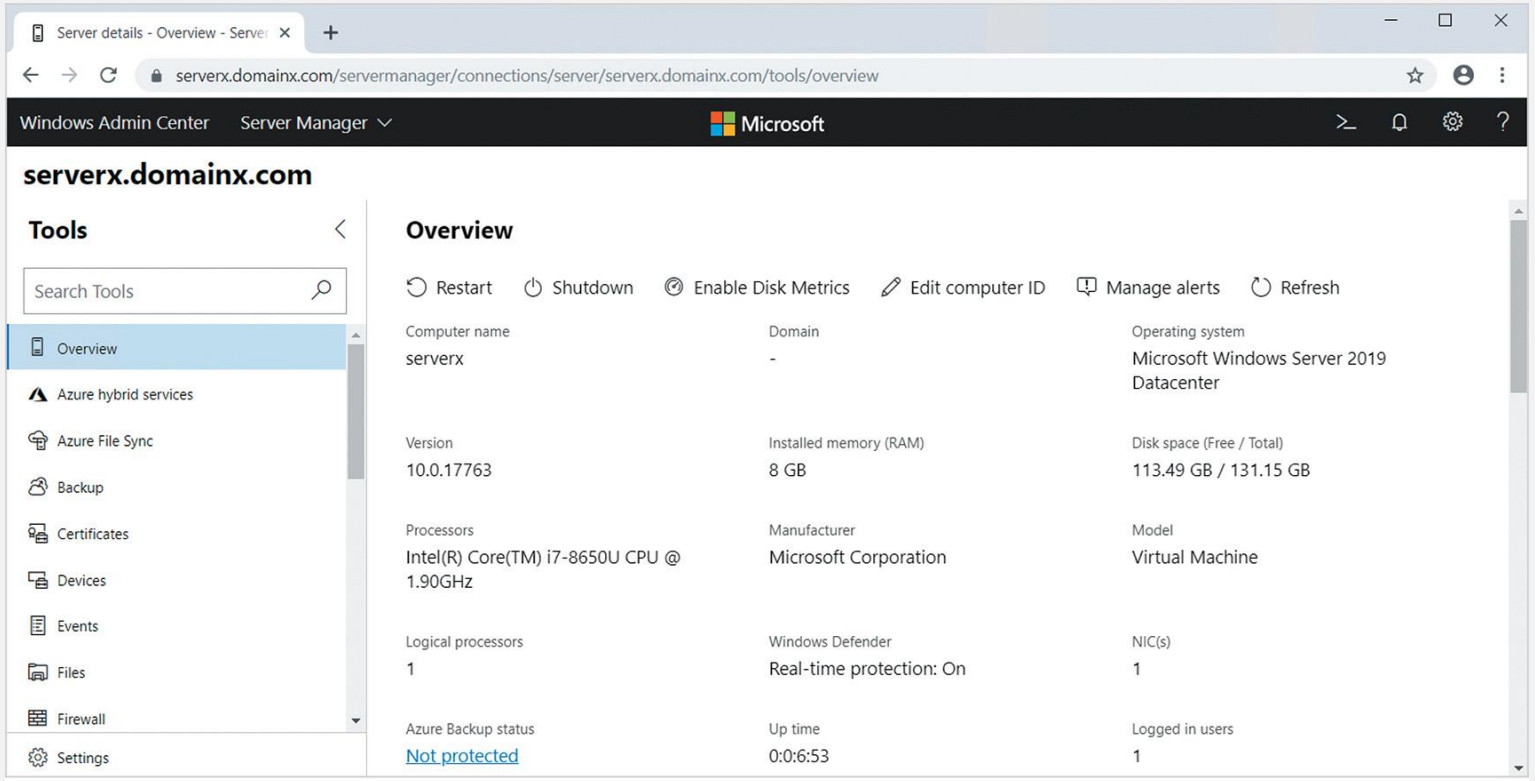

Figure 2-22 Managing *serverx.domainx.com* within the Windows Admin Center

Configuring Server Hardware Devices

- Many types of hardware devices
- Plug and Play (PnP)
  - Operating system works with hardware devices to automatically detect and configure recently installed hardware to work with the operating system
- Simple PnP device installation process
  - Attach device
  - Wait for Windows Server 2019 to detect it
  - Install appropriate device drivers

Adding Hardware Using Control Panel (1 of 2)

- Devices and Printers utility
  - Force the operating system to detect and install new PnP hardware
  - Install non-PnP hardware
  - Troubleshoot problems you might be having with existing hardware
- Start Devices and Printers utility from the Control Panel
  - Two views: Category view or Classic view
- Sample tasks
  - Add device, display device, troubleshoot device

Adding Hardware Using Control Panel (2 of 2)

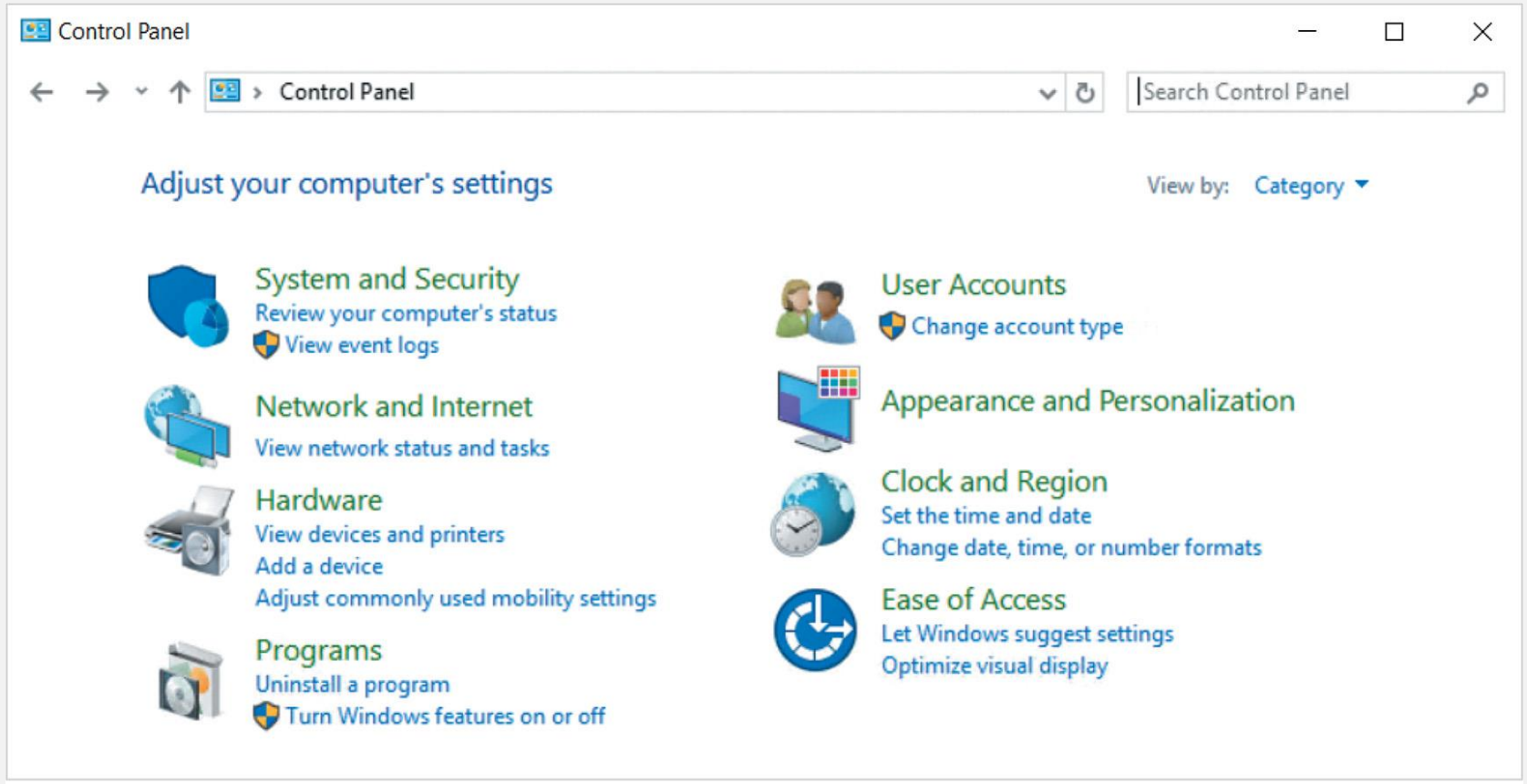

Figure 2-23 Category view in Control Panel

Using Device Manager (1 of 3)

- Device Manager shows all devices on the system
- Open Device Manager from Control Panel to update a device driver
  - Generic or Unknown devices require updated drivers for full functionality
  - PnP hardware resource must be considered to prevent conflicts
    - Interrupt Request (IRQ) line, Input/Output (I/O) address, reserved memory range
- Can check for a resource conflict and examine other device properties
  - Device Properties box has four tabs to review

Using Device Manager (2 of 3)

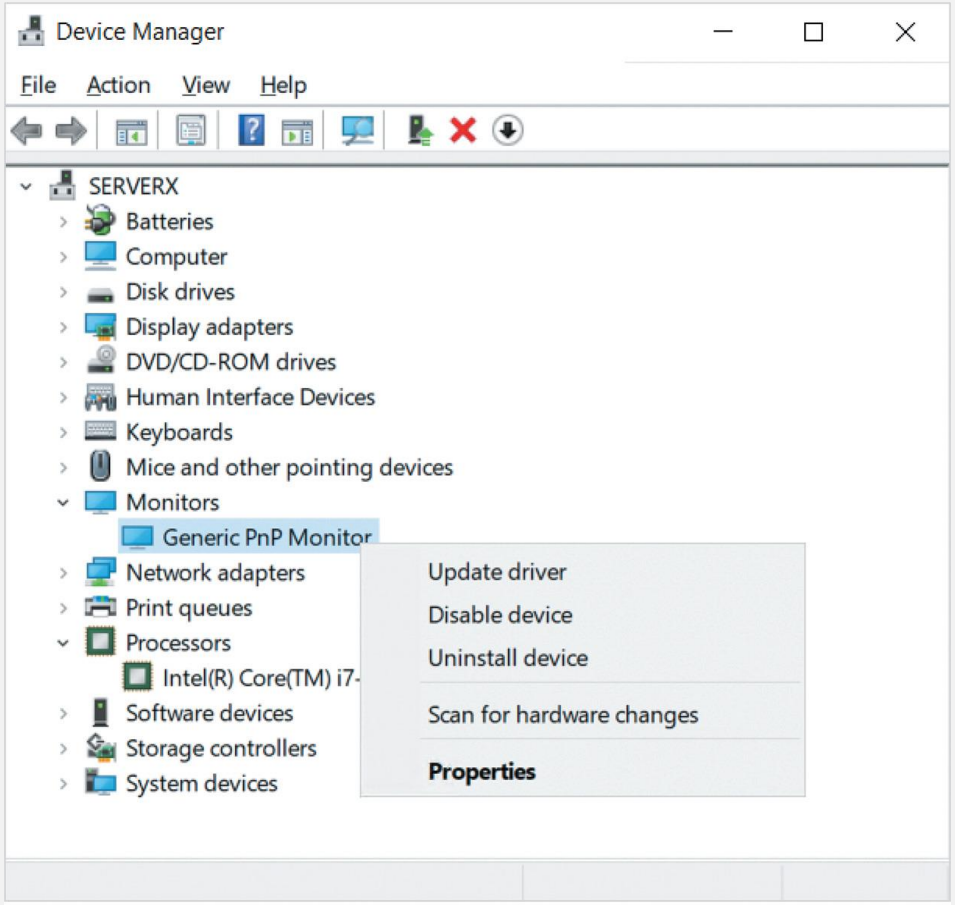

Figure 2-24 Right-clicking a device within Device Manager

Using Device Manager (3 of 3)

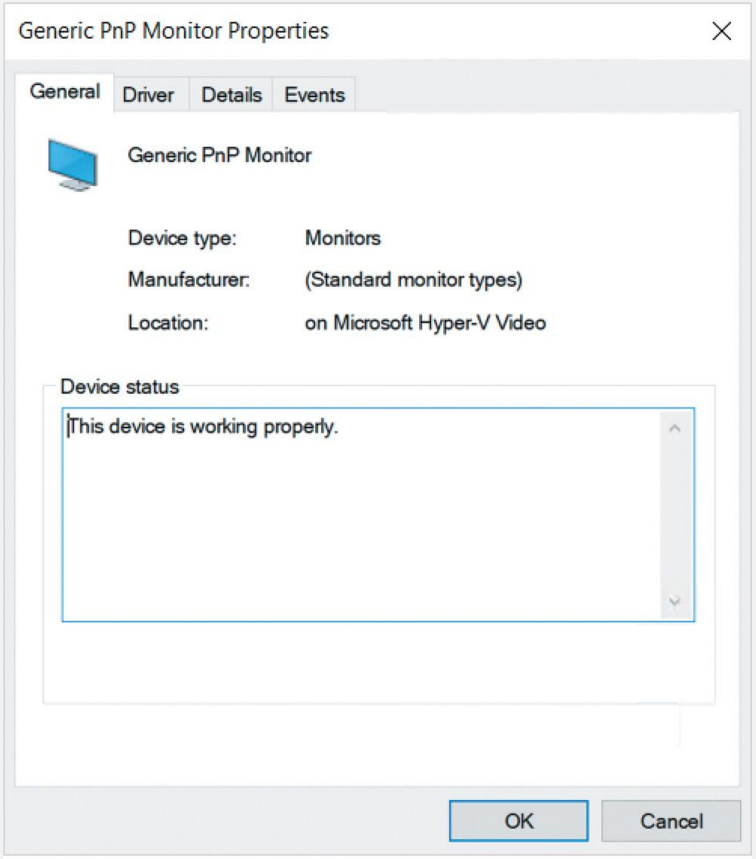

Figure 2-25 Properties of a device within Device Manager

Verifying System Files

- System file signatures can become invalid
  - Overwritten, corrupted, modified by malware
- System File Checker
  - Scans system files for integrity
  - Replaces damaged or overwritten files with the proper version
- File Signature Verification tool (Sigverif)
  - A scan-only tool that determines if files have a signature
  - Output written to a log file called `sigverif.txt`

Configuring Windows Settings

- Configurable elements of the operating system
  - Performance options
  - Environment variables
  - Startup and recovery options
  - Power options

Configuring Performance Options (1 of 4)

- Configuring processor scheduling and Data Execution Prevention
- Processor scheduling
  - Configures processor resources allocated to a program
- Data Execution Prevention (DEP)
  - Monitors server programs for memory use issues
- In Control Panel, navigate to System and Security, and select System
  - Select Advanced system settings, click Settings in the Performance section
  - Highlight Advanced tab or Data Execution Prevention tab

Configuring Performance Options (2 of 4)

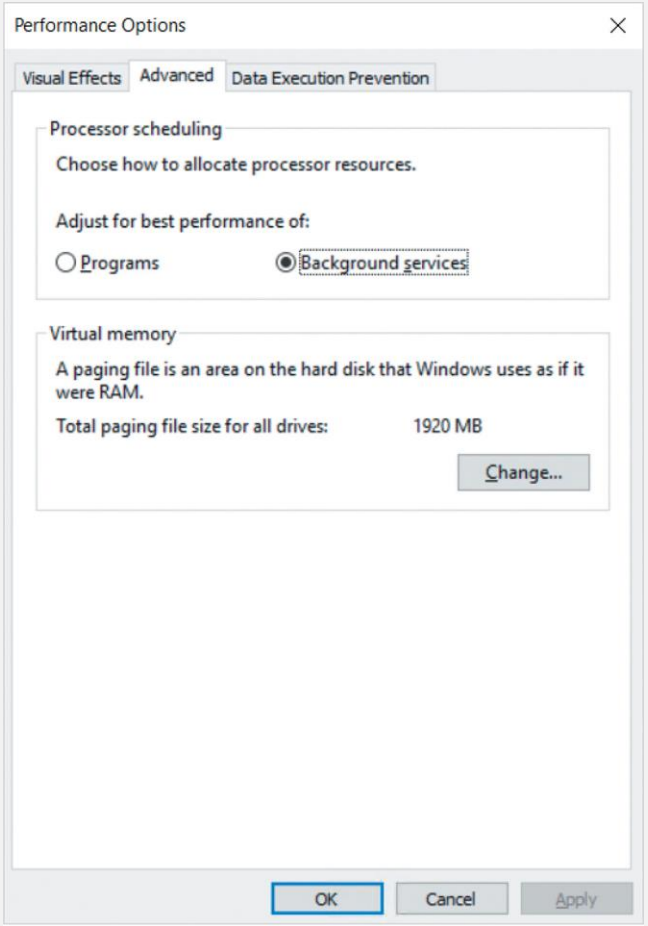

Figure 2-28 Configuring processor scheduling

Configuring Performance Options (3 of 4)

- Configuring virtual memory
- Virtual memory: disk storage used to expand capacity of physical memory
  - Uses a paging technique
    - Pages move from physical memory into virtual memory on disk
- Paging file: area of disk allocated for virtual memory
  - Location of the paging file is important
  - Parameters used to tune paging file size: initial size and maximum size
  - Configure initial size by multiplying amount of installed RAM times 1.5

Configuring Performance Options (4 of 4)

- Configuring file caching
- File caching turned on by default
  - Speeds up the time it takes to read from or write to a disk
- Flushing
  - Freeing memory used for cached data after data written to disk
- Can turn off caching and flushing to easily hot swap a drive
  - Server can seem slower to users
  - May lose data during hot swap while the server is in use

Configuring Environment Variables (1 of 2)

- Environment variable
  - Tells the operating system where to find certain programs and program-related information
- System environment variables are defined by the operating system
  - Apply to any user logged in to the computer
- User environment variables are defined on a per-user basis
  - Used to provide a wide variety of different information

Configuring Environment Variables (2 of 2)

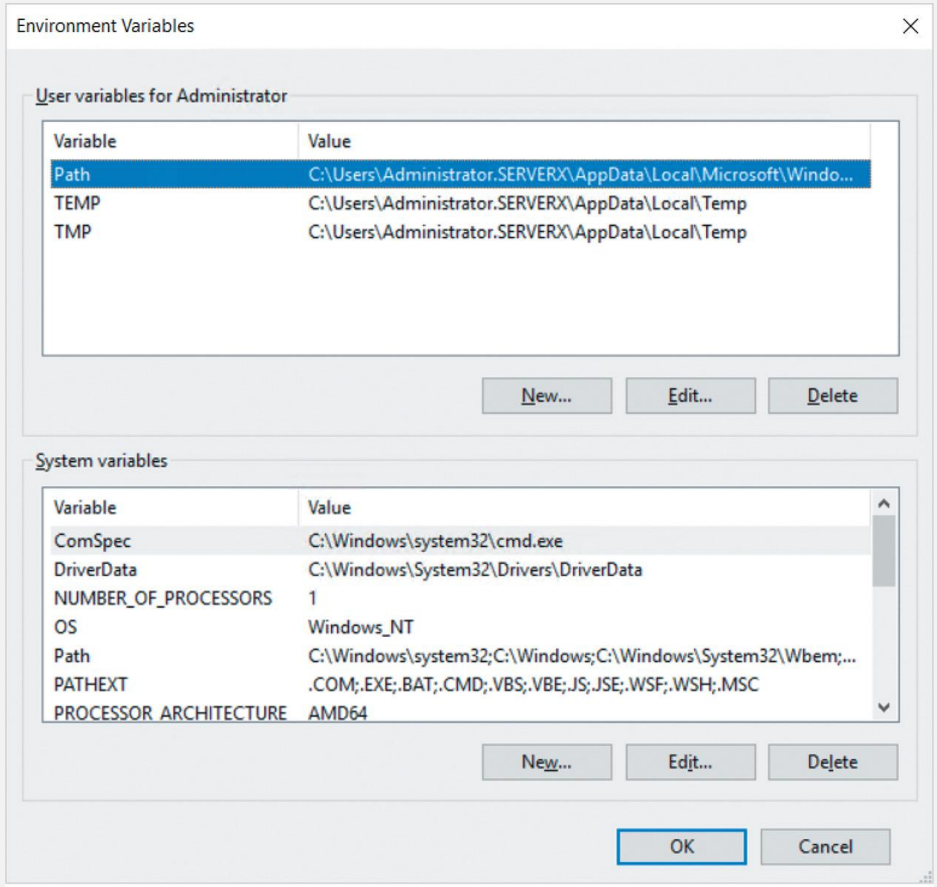

Figure 2-32 Configuring environment variables

Configuring Startup and Recovery

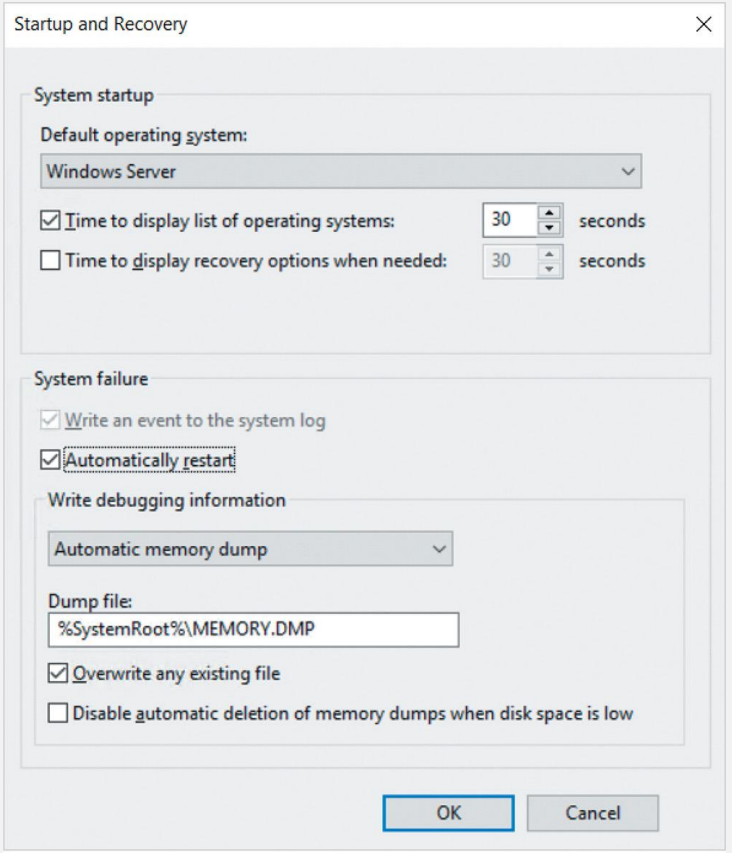

Figure 2-33 Configuring startup and recovery options

Configuring Power Options (1 of 2)

- Power options that can be set
  - Select a power plan
  - Choose what the power button does
  - Create a power plan
  - Choose when to turn off the display
- Three power plans
  - Balanced, Power saver, and High performance

Configuring Power Options (2 of 2)

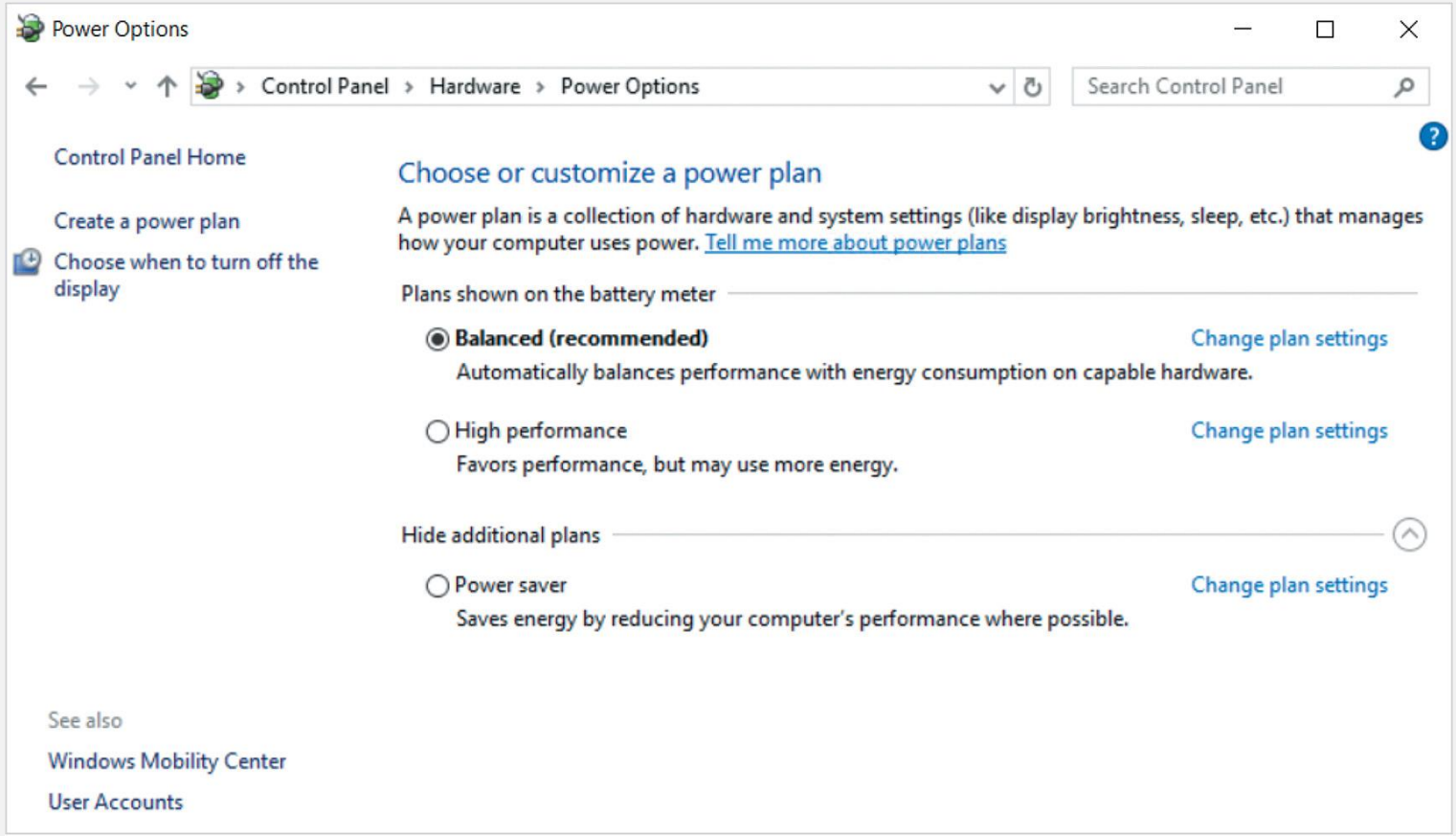

Figure 2-34 Configuring power options

The Windows Registry

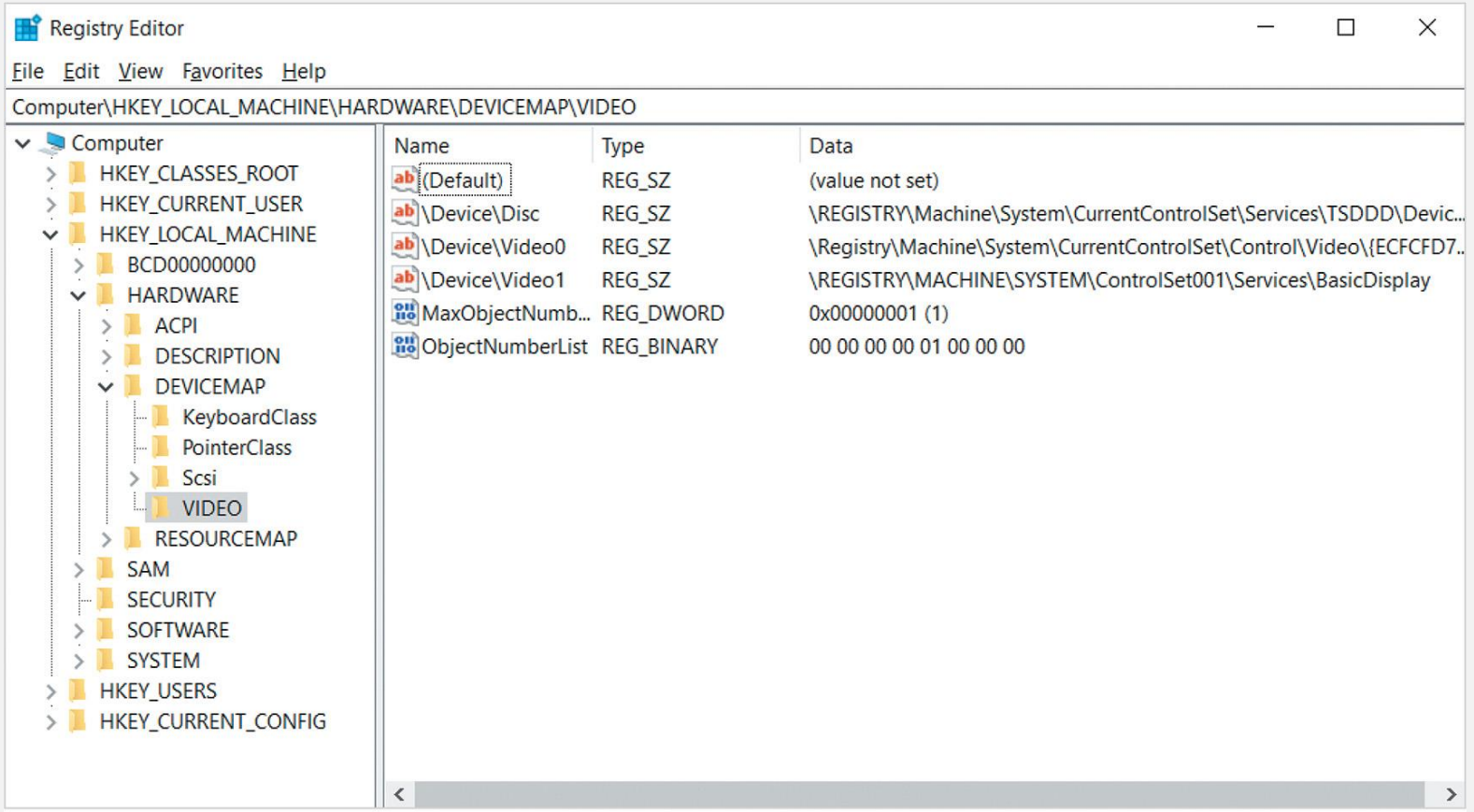

Figure 2-35 The Registry Editor

Windows Registry Contents

- Windows Registry is hierarchical in structure
  - Made up of keys, subkeys, and entries
- Windows Server 2019 Registry's five root keys
  - HKEY_LOCAL_MACHINE
  - HKEY_CURRENT_USER
  - HKEY_USERS
  - HKEY_CLASSES_ROOT
  - HKEY_CURRENT_CONFIG

Working with Windows PowerShell (1 of 7)

- Supports MS-DOS shell output redirection (>>) and command chaining (;)
- Most commands run within PowerShell will consist of cmdlets
- Piping (|) sends information between cmdlets to build more complex commands or filters output to display only the desired output
- Many cmdlets options
  - `-whatif`, `-confirm`, `-verbose`, `-debug`, `-erroraction`
- PowerShell supports special navigation keys and key combinations
- PowerShell's features provide additional functionality or increase efficiency

Working with Windows PowerShell (2 of 7)

- Customizing Windows PowerShell sessions
  - Change Windows PowerShell session's look or how it is executed
  - Provide specific options to the PowerShell command
  - Creating a PowerShell console file that has a `.psc1` extension
- Aliases and functions
  - Alias is a command shortcut that makes navigating and using Windows PowerShell easier
  - Functions can execute multiple cmdlets

Working with Windows PowerShell (3 of 7)

- PowerShell profile scripts
  - Alias and function commands placed in a PowerShell profile script
  - Automatically executed every time Windows PowerShell started for the user
  - Must first enable script execution before making the script
  - Edit PowerShell profile using the command `notepad $profile` within PowerShell
- Modifying command output
  - Pipe output, `-recurse` option, `Sort-Object`, `Group-Object`, `ConvertTo-HTML`, `Export-CSV`

Working with Windows PowerShell (4 of 7)

- PowerShell objects
  - Object has attributes (properties that describe the object)
  - Methods (things that the object can do)
  - Control nearly all aspects of the Windows operating system
    - Processes, files, and network sockets

Working with Windows PowerShell (5 of 7)

- PowerShell provider plugins
  - Provide functionality within Windows PowerShell
  - Allow PowerShell to interact with other parts of the system
- Filesystem provider: default provider
- Many other providers
  - Variable provider, environment provider, alias provider, function provider, certificate provider, registry provider
- Many cmdlets supported

Working with Windows PowerShell (6 of 7)

Table 2-1: Cmdlets that can be used with any PowerShell provider				
Cmdlet	**Alias**	**DOS**	**UNIX/Linux**	**Description**
Get-Location	gl,pwd	pwd	ls	Display current directory/ location
Set-Location	sl,cd,chdir	cd,chdir	cd	Change current directory/ location
Copy-Item	cpi,copy,cp	copy	cp	Copy files/items from one location to another
Remove-Item	ri,del	del	rm	Remove file/item
Move-Item	mi,move,mv	move	mv	Move file/item

Working with Windows PowerShell (7 of 7)

Table 2-1: Cmdlets that can be used with any PowerShell provider				
Cmdlet	**Alias**	**DOS**	**UNIX/Linux**	**Description**
Rename-Item	ren,rni	rn	mv	Rename file/item
New-Item	ni	Create new file/item		
Clear-Item	cli	Clears the contents of a file/ item		
Set-Item	si	Sets the contents of a file/ item		
Get-Content	gc,type,cat	type	cat	Views the contents of a file/ item

System Administration Commands

- PowerShell can be used for many tasks
  - Post-installation tasks
  - View, install, and remove Windows roles and features
  - Configure and troubleshoot the network and configure firewall settings
  - Manage services and processes
  - Perform remote administration of computers within a domain environment
- Cmdlets allow an administrator to specify the computer name for a task
- Can execute a PowerShell script on several computers within a domain

Using WMI within Windows PowerShell

- WMI consumers: programs and system software that can query WMI
- WMI infrastructure: collective components built into the operating system that respond to WMI queries
  - WMI namespaces, WMI providers, WMI classes
- CIMv2 namespace (Common Information Model version 2)
  - Queries hardware and software components on systems
  - Modifies software components
- Real power of WMI: within WMI classes administrators query and manipulate

Creating PowerShell Scripts (1 of 9)

- PowerShell script
  - Text file with a `.ps1` extension executed within Windows PowerShell
  - Commands execute from top-to-bottom
  - Contents
    - Windows commands, PowerShell cmdlets, complex control structures
  - Can reuse Windows PowerShell code in different situations

Creating PowerShell Scripts (2 of 9)

- Executing PowerShell scripts
  - Enable script support in Windows PowerShell and verify execution policy
  - Execute a PowerShell script in PowerShell
    - Full path: `C:\scripts\myscript.ps1`
    - Relative path (within the `C:\scripts` directory): `.\myscript.ps1` or `./myscript.ps1`
  - Execute a PowerShell script outside PowerShell
    - Run PowerShell command in the Windows Run dialog box Command Prompt window, supply script path as an argument

Creating PowerShell Scripts (3 of 9)

- Using Windows PowerShell ISE
  - Windows Server 2019 start menu shows Windows PowerShell ISE
  - Click the Script icon above the Windows PowerShell pane
    - Opens a new PowerShell script in the upper pane called `Untitled.ps1`
    - Modify, test, and save with a descriptive name
- Can create and test scripts on remote computers
  - Need winRM started within Windows PowerShell ISE

Creating PowerShell Scripts (4 of 9)

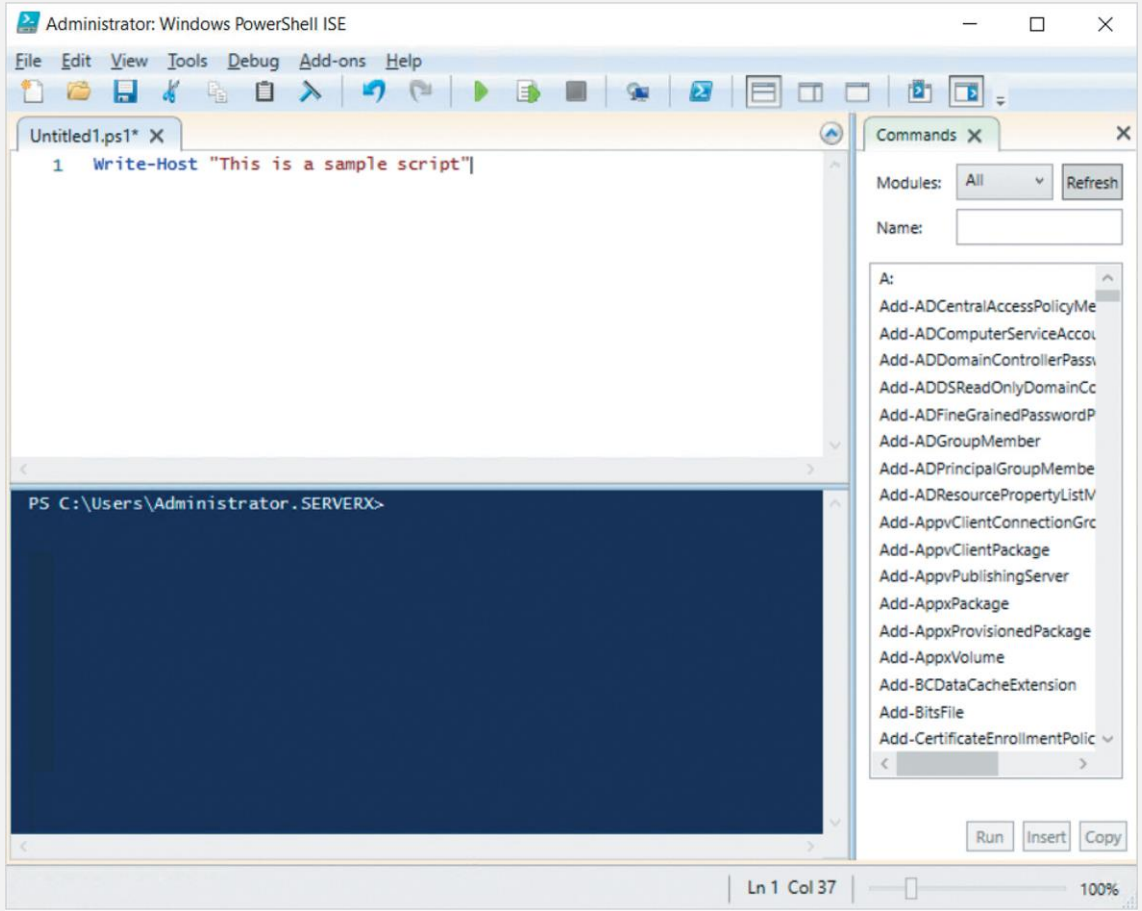

Figure 2-36 Windows PowerShell ISE

Creating PowerShell Scripts (5 of 9)

- Variables and constants store a value in memory for later use
  - Variable and array variable values can be changed after being set
    - PowerShell variables start with a $, not case sensitive
    - Avoid special characters and reserved words within a variable name
    - Use `Set-Variable` cmdlet
    - Add -`option` constant to the `Set-Variable` cmdlet to create a constant variable
    - Prefix the variable with a type cast to change text string behavior
  - Constant values cannot be changed

Creating PowerShell Scripts (6 of 9)

- Protecting PowerShell metacharacters
  - Double-quotes ("), single-quotes ('), back-quote (`)
- Coloring and formatting output eases readability
  - Many cmdlets allow for the modification of the output color
  - Separator characters used when printing several variables
- Decision constructs allow modification of the flow of a PowerShell script
  - Must have condition that returns true or false
  - Compare data with operators, use the `if` and `switch` constructs

Creating PowerShell Scripts (7 of 9)

Table 2-2: Common comparison operators within Windows PowerShell	
Operator	**Description**
-eq	Equal to (case insensitive if comparing strings)
-ne	Not equal to
-lt	Less than
-gt	Greater than
-ge	Greater than or Equal to
-le	Less than or equal to
-ceq	Equal to (case-sensitive)
-ieq	Equal to (case-insensitive, the default)

Creating PowerShell Scripts (8 of 9)

Table 2-3: Common logical operators within Windows PowerShell	
Operator	**Description**
-and	And
-or	Or
-not	Not
!	Not

Creating PowerShell Scripts (9 of 9)

- Loop constructs allow the performance of a task several times
  - `foreach`, `for`, `while`, `do...while`, and `do...until`
- Creating your own PowerShell scripts
  - Start small, use comments
  - Ensure script allows the cmdlets to operate on different objects
- Finding PowerShell scripts on the Internet
  - Use Web sites with reusable PowerShell scripts organized by function
  - Search the Internet using a search engine such as Google

Summary

- Many tools help with the configuration process
  - Server Manager adds roles
  - BPA verifies role and server function configuration
  - Windows Admin Center provides remote Web-based management
  - Devices and Printers tool and Device Manager tool configure devices
  - Many performance option settings can be configured
- Window Registry stores configurations used by Windows Server 2019
- PowerShell console files and profile scripts ease administration