Chapter 11: Windows Configuration

IT Essentials v7.0

Chapter 11 - Sections & Objectives

11.1 Windows Desktop and File Explorer

- Configure the Windows Desktop and File Explorer
  - Compare versions of Windows 7, 8, 8.1, and 10.
  - Use features of the Windows desktop.
  - Use Windows Task Manager to manage running processes and services.
  - Use File Explorer to manage files, folders, and applications.

Chapter 11 - Sections & Objectives (Cont.)

11.2 Configure Windows with Control Panels

- Configure Windows using Control Panels

  - Use Microsoft Windows control panel utilities.

  - Configure user accounts with control panels.

  - Configure internet and network connectivity using control panels.

  - Configure Windows display settings.

  - Use System and Power Options control panels.

  - Use hardware and sound control panels.

  - Use the clock, region, and language control panels or settings to configure a computer for a location.

  - Use the Programs and Features control panel to manage Windows software.

  - Explain how the Windows troubleshooting control panel to investigate system issues.

Chapter 11 - Sections & Objectives (Cont.)

11.3 System Administration

▪ Use Windows tools and utilities to manage Windows systems.

- Manage system resources with Microsoft Windows utilities.
- Use Microsoft Windows utilities to manage system operation.
- Manage system volume storage with Microsoft Windows utilities.
- Manage software applications.

11.4 Command-Line Tools

▪ Use Microsoft Windows command line tools..

- Use the Windows command window CLI.
- Use file system CLI commands to work with the Windows file system.
- Use disk CLI commands to work with Windows disks.
- Use task and system CLI commands to control Windows operation.
- Use other CLI commands to accomplish Windows tasks.

Chapter 11 - Sections & Objectives (Cont.)

11.5 Windows Networking

- Configure a Windows computer to work on a network.

  - Configure a Windows computer to share resources on a network.
  - Configure local resources to be shared with other network users.
  - Configure wired network interfaces in Windows.
  - Configure wireless network interfaces in Windows.
  - Use Windows applications to access remote computers.
  - Use remote Windows Remote Desktop and Remote Assistance to work with remote computers.

11.6 Common Preventive Maintenance Techniques for Operating Systems

- Use common preventive maintenance techniques for Microsoft Windows operating systems.

  - Perform preventive maintenance on a computer using Microsoft Windows tools.
  - Perform system restore procedures.

Chapter 11 - Sections & Objectives (Cont.)

11.7 Basic Troubleshooting Process for Windows Operating Systems

- Troubleshoot Microsoft Windows operating systems.

  - Explain the six steps of troubleshooting a Microsoft Windows operating system.
  - Describe common problems and solutions related to Microsoft Windows operating systems.
  - Troubleshoot advanced Windows operating systems problems.

11.1 Windows Desktop and File Explorer

Windows Versions

- Since 1985 there have been over 25 versions of Windows.

- Windows comes in 32-bit or 64 bit editions.

- In the case of Windows 10, twelve editions were developed and released, however, only nine are currently offered.

Windows 7

- Released in October 2009, Windows 7 was quite successful.

- Offered improvements to the interface, performance, and File Explorer, including the first appearance of Libraries and HomeGroup file sharing.

- Microsoft offers extended support for Windows 7 until January of 2020.

Windows 8

- Released in October 2012, Windows 8 included a major revision in the Windows interface.

- Windows 8 was designed to be more compatible with touch screen, tablets and mobile devices.

- The interface changes were unpopular and made it difficult for some users to learn.

Windows 8.1

- Windows 8.1 was released one year after Windows 8 in October 2013.

- Windows 8.1 included a Start screen familiar to users, and a full Start menu button in the taskbar.

- It included new functionalities and easier configuration options for the desktop GUI interface.

Windows 10

Overview of Windows Versions

Version	Release Date	Important Features	End of Support
10	July 2015	Improved desktop interface combines menu entries and tiles in the Start menu. Universal apps. Windows Action Center replaces charms.	Mainstream: October 2020 Extended: October 2025
8.1	October 2013	Start screen more similar to Windows 7. More interface configuration options.	January 2023
8.0	October 2012	Interface optimized for mobile devices. Anti-virus included. File Explorer instead of Windows Explorer. Unpopular and considered hard to learn.	January 2016
7	October 2009	Improved interface. Improved taskbar. Libraries. HomeGroup file sharing.	January 2020

Windows 10

- Windows 10 offers a return to a desktop-oriented interface.

- Windows 10 supports universal apps that run on desktop and mobile devices.

- Windows 10 introduced the Microsoft Edge web browser.

- Charms were replaced with the Windows Action Center with notifications and quick settings.

- New update model with feature updates twice yearly and quality or cumulative updates monthly.

The Windows 7 Desktop

- Windows 7 has a default theme named Aero.

- Windows 7 Versions and above have the following features:

  - **Shake** – minimize all windows not being used by clicking and shaking the window.

  - **Peek** - View the desktop icons that are behind open windows by placing your cursor over the Show desktop button found at the right edge of the taskbar.

  - **Snap** - Resize a window by dragging it to one of the edges of the screen.

- Users can place Gadgets on the desktop. Gadgets are small applications, such as games, sticky notes, a calendar, or a clock.
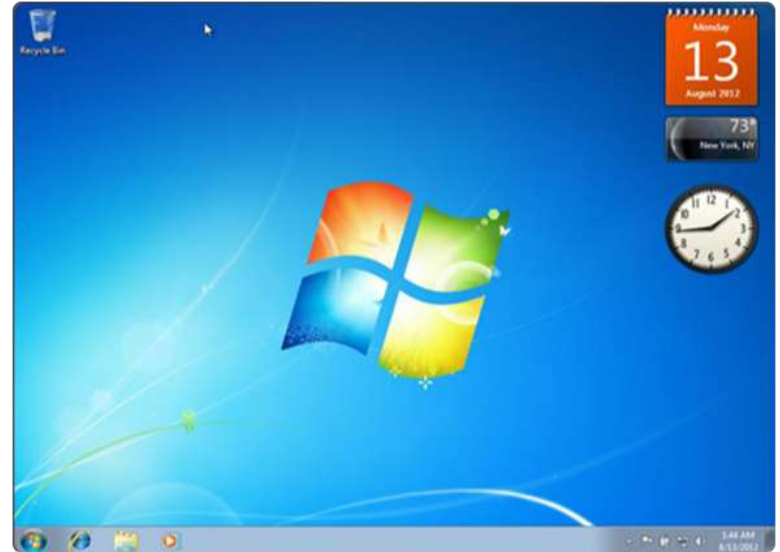
Note: Microsoft has retired the Gadgets feature in versions following Windows 7 because of security concerns.

The Windows 8 Desktop

Windows 8 desktop included:

- Tiles on the Start screen

- Desktop optimized for mobile devices

- Revised task manager

- Ribbon menu on the File Explorer

- Windows Defender native antivirus

- Charms bar of five icons, accessed by placing the cursor in the upper-right corner of the screen or swiping your finger in from the right side of the screen on a touchscreen
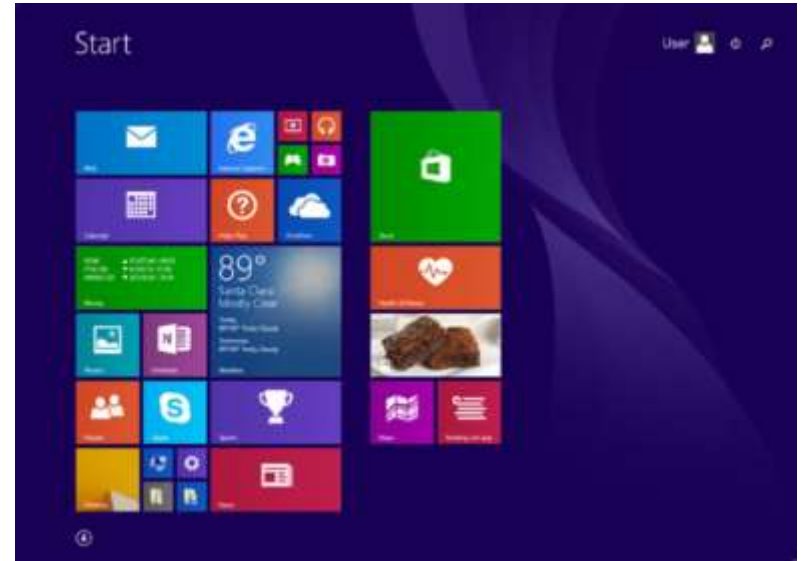
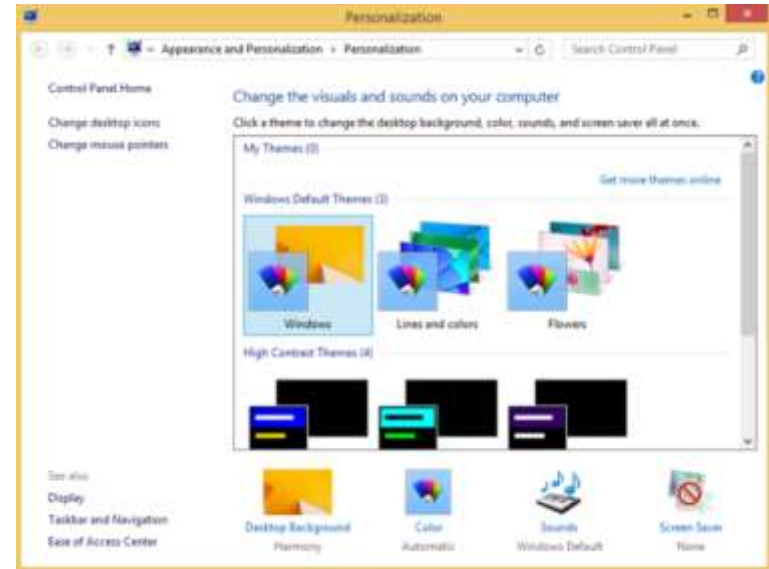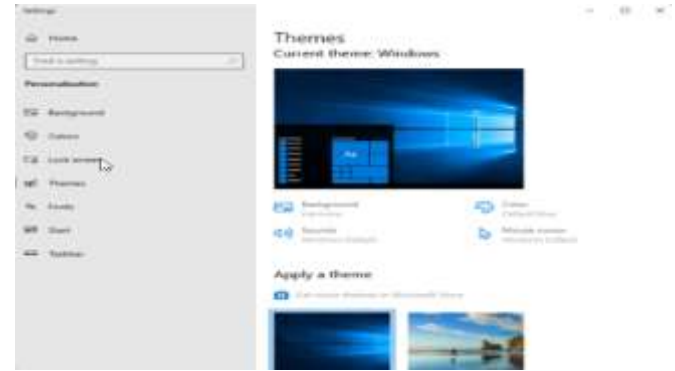# The Windows 8.1 Desktop

The Windows 8.1 desktop interface includes:

- Taskbar

- Start button

- Pinned program icons

Clicking the Start button displays the Start screen that is very similar to the Windows 8 Start screen.

Personalizing the Windows Desktop

- **Themes** - fastest way to change the look and feel of the Windows GUI

- **Apps Environment** - desktop start screen

  - **Tiles** - click and drag the tiles to rearrange them.

  - **Start screen** - right-click the desired Windows app and select Pin to Start.

  - **Search** - start typing the name of the app to auto search.

- **Personalization Window** - you can change the desktop appearance, display settings, and sound settings

Video Explanation – The Windows 10 Desktop

Video Demonstration: The Windows 10 Desktop

In this video demonstration, you will learn about:

- Desktop icons
- Start button
- Live tiles
- Task bar
- Notification area
- Taskbar settings

0:01

The Windows Desktop
The Windows 10 Start Menu

Tiles for Apps arranged by category, such as games, creative software, etc.

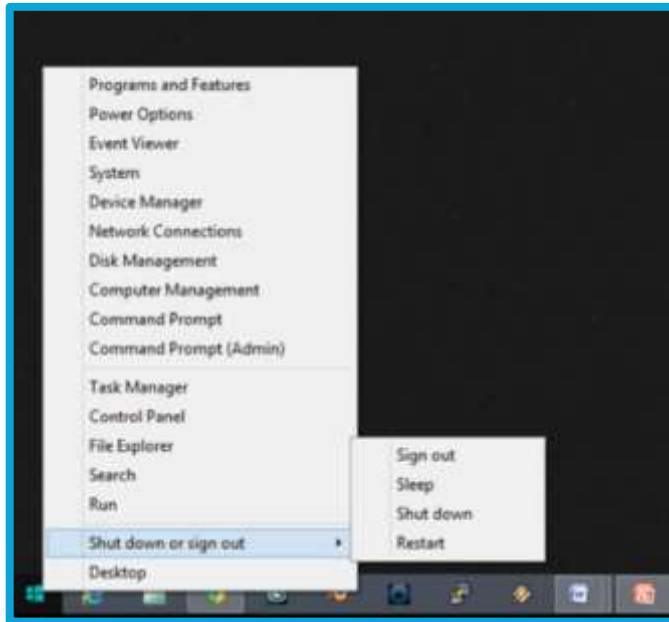Applications in alphabetical order, including most used and recently installed

Shortcuts to common libraries, including settings and shutdown buttons
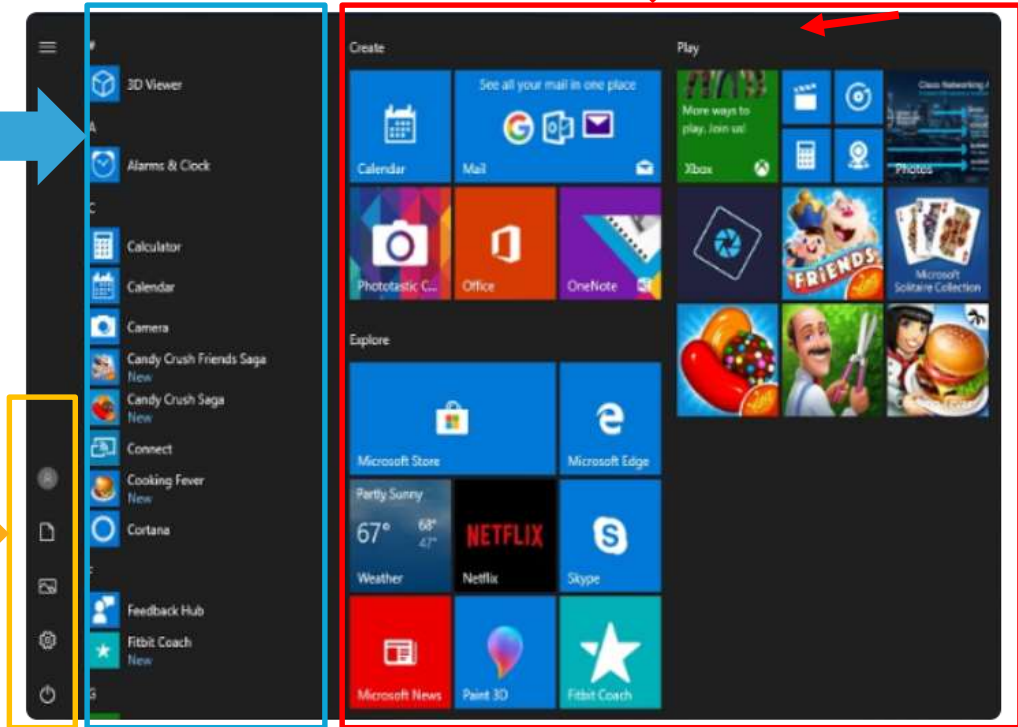
The Windows 8.1 and 8.0 Start Menu

- Windows 8 Start screen and Apps screen

- Windows 8.1 Limited Start Menu

The Windows 7 Start Menu

- The Start Menu displays:

  - All of the applications installed on the computer

  - A list of recently opened documents

  - A list of other elements, such as the search feature, Help and Support, and Control Panel

- To customize the Start Menu in Windows 7 right-click an empty section of the taskbar and choose Properties > Start Menu > Customize

The Taskbar
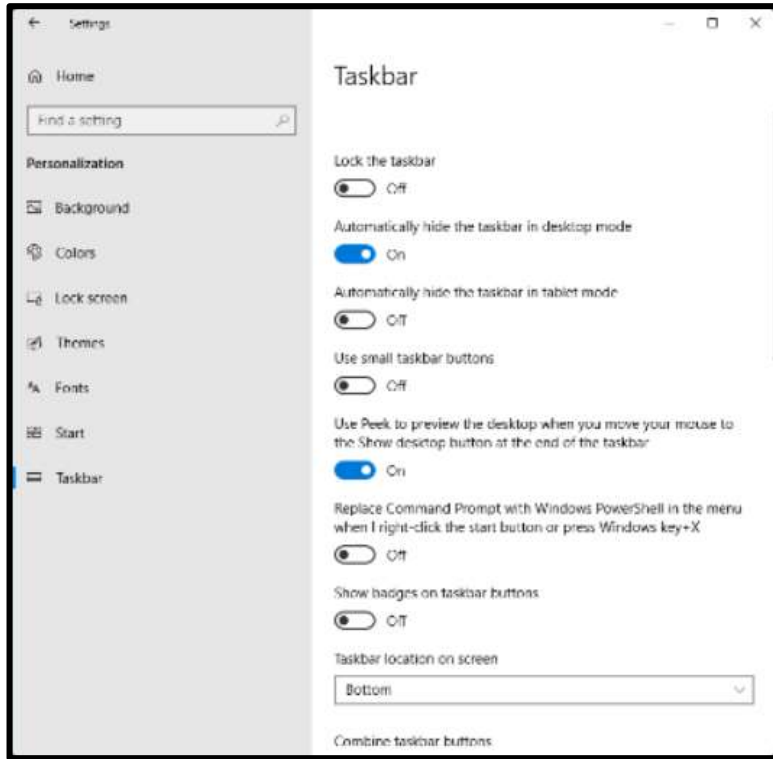
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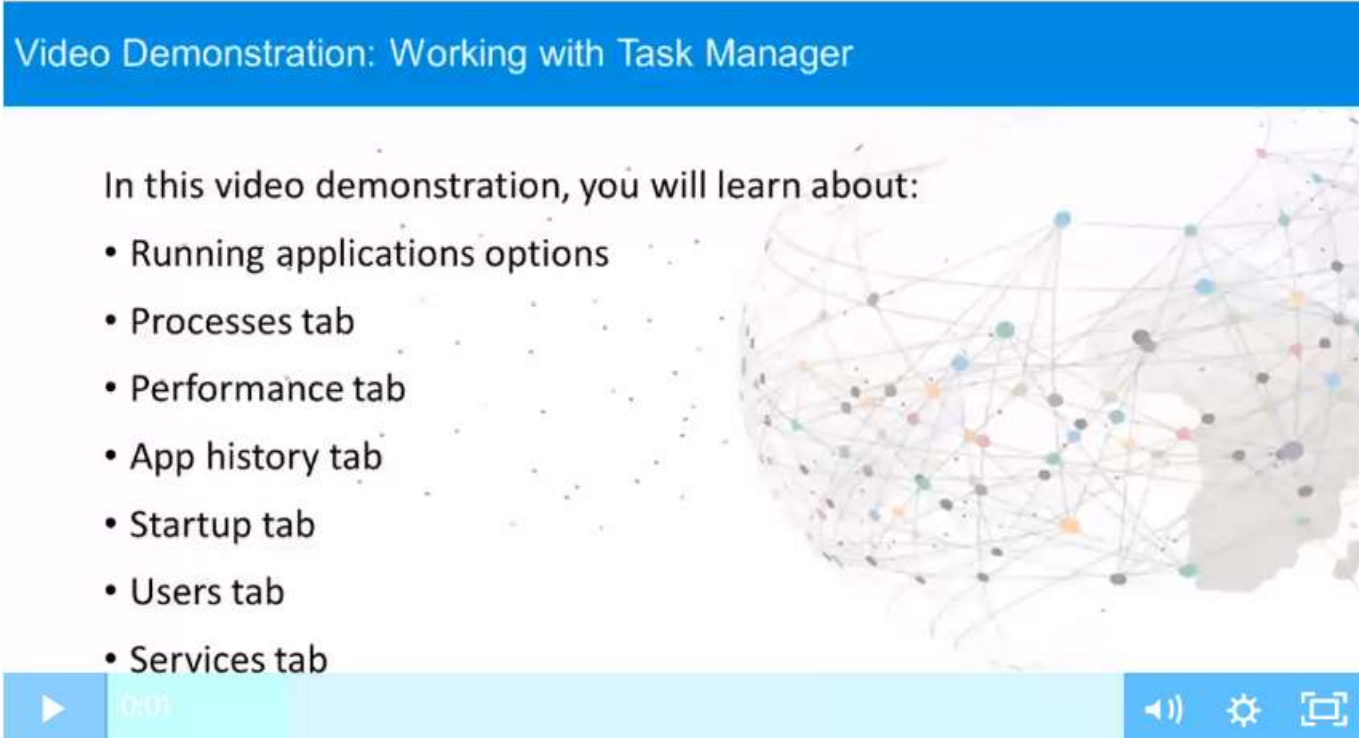
Lab – Configure the Windows Desktop

In this lab, you will explore the Windows Desktop, Start Menu, and Taskbar.

Video Explanation – Working with Task Manager in Windows 10

Video Demonstration: Working with Task Manager

In this video demonstration, you will learn about:

- Running applications options
- Processes tab
- Performance tab
- App history tab
- Startup tab
- Users tab
- Services tab

Windows Task Manager Functions

- **Processes** – a set of instructions started by the user, a program, or the OS.
- **Performance** – dynamic system performance graphs for a variety of options, including CPU, Memory, Disk, Ethernet, etc.
- **App History** – displays historical resource utilization such as CPU time, network data usage, data uploads and downloads.
- **Startup** – shows the processes that automatically begin during Windows startup.
- **Users** – shows who is currently connected to the PC and the system resources they are using.
- **Details** – makes is possible to change the level of COU priority for a given process.
- **Services** – shows all available services and their status.

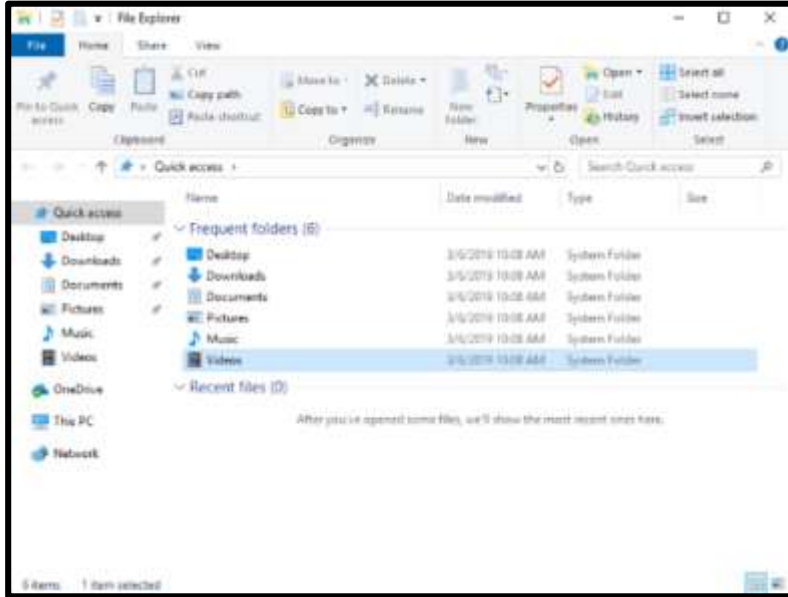# Task Manager in Windows 7
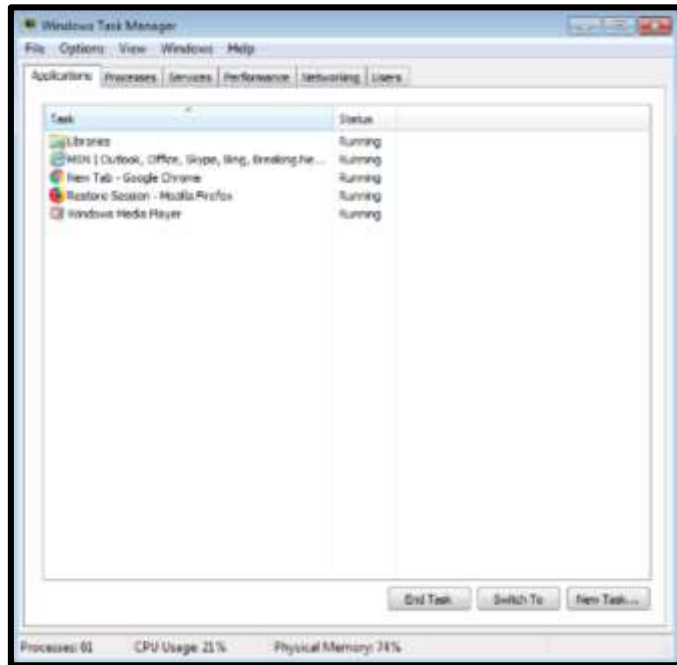
- Windows 7 Task Manager has six tabs:

  - **Applications** – shows all running applications. You can create, switch to, or close any applications.

  - **Processes** - this tab shows all running processes. You can end processes or set process priorities.

  - **Services** - available services, including their operational status. Services identified by their PID.

  - **Performance** - This tab shows the CPU and page file usage

  - **Networking** - This tab shows the usage of all network adapters

  - **Users** - This tab shows all users that are logged on the computer

- Task Manager Differences in Windows 10:

  - **Applications and Processes tabs** have been combined in Windows 10.

  - **Networking tab** is included with the Performance tab in Windows 10.

  - **Users tab** has been enhanced in Windows 10 to not only show the users that are connected but also the resources that they are using.

Lab – Work with Task Manager

In this lab, you will use Task Manager to monitor system performance.

File Explorer

- File Explorer is used for file management in Window 8 and Windows 10.

- Windows Explorer is used for file management in Windows 7 and earlier.

- The Ribbon is used for common tasks, such as copying and moving files and creating new folders.

- The Tabs at the top change based on what is selected.

- File Explorer is used to:

  - Navigate the file system

  - Manage files, folders and subfolders

  - Manage applications on storage media

  - Preview some types of files

Video Explanation – Working with File Explorer

Video Demonstration: Working with File Explorer

In this video demonstration, you will learn about:

- Quick access
- This PC
- Libraries
- Library tools
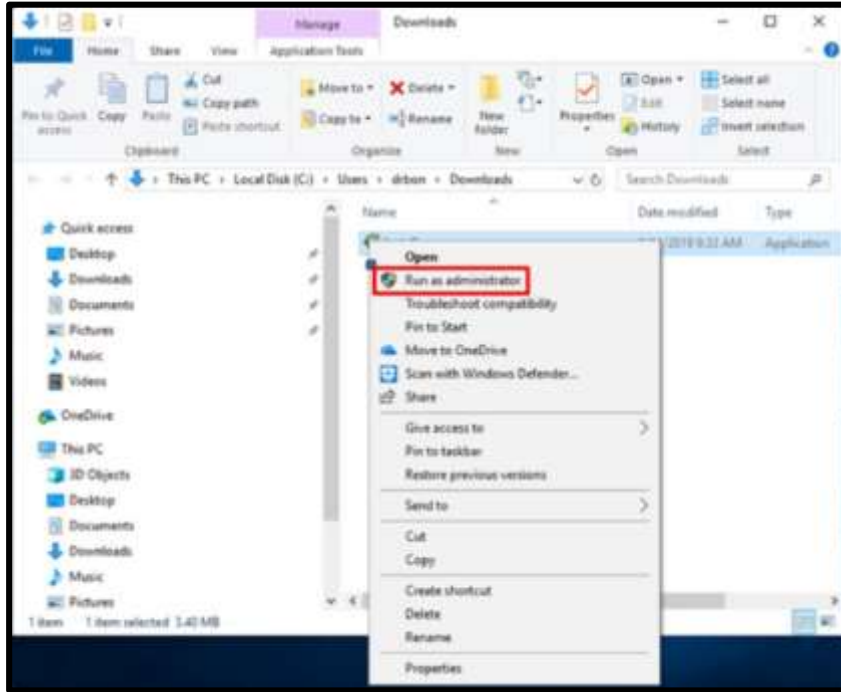- Folder and search options

0:02
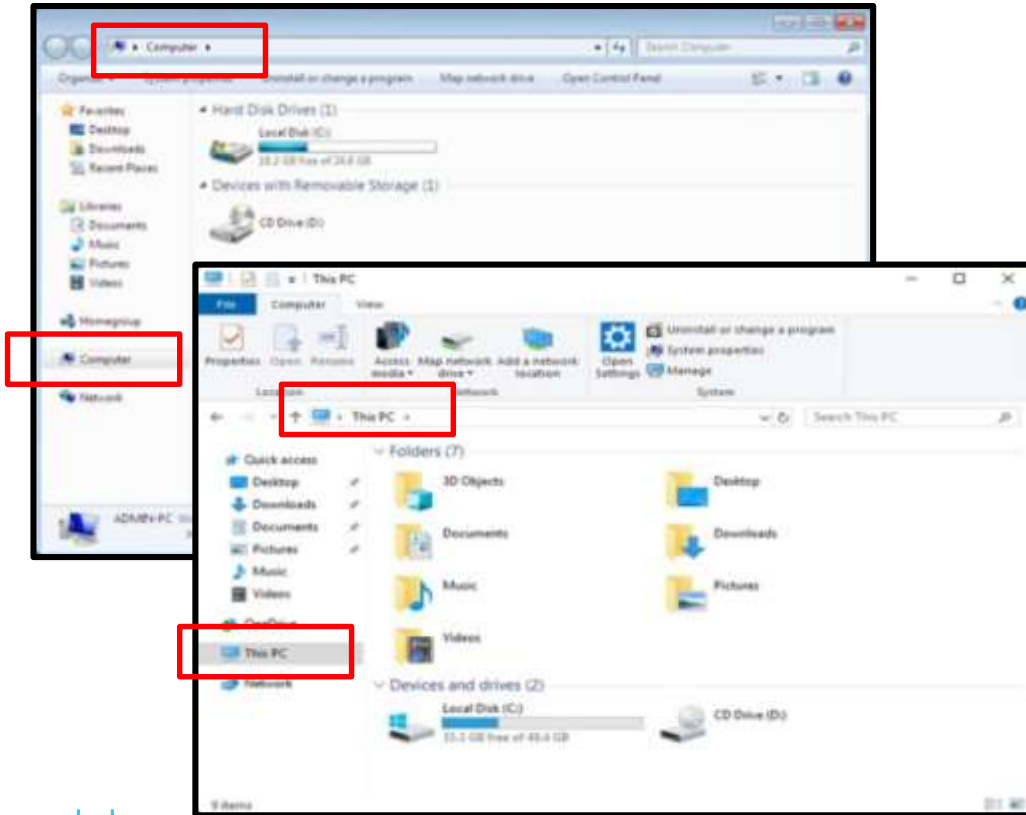
This PC

- In Windows 10 and 8.1, the This PC feature allows you to access the various devices and drives installed in the computer.

- In Windows 7, this same feature is called Computer.

- To open This PC, open File Explorer, and it will display the This PC feature by default.

- In Windows 8.0, or 7, click Start and select Computer.

Run as Administrator

- Modern operating systems improve security by only allowing users with enough permissions to access files.

- System files, other user files, or files with elevated permissions are examples of files that could lead Windows to deny access to a user.

- To override this behavior and gain access to those files, you must open or execute them as the system administrator.

- To open or execute a file using elevated permission, right-click the file and choose **Run as Administrator** as shown in the figure. Choose **Yes** in the User Account Control (UAC) window.

Windows Libraries
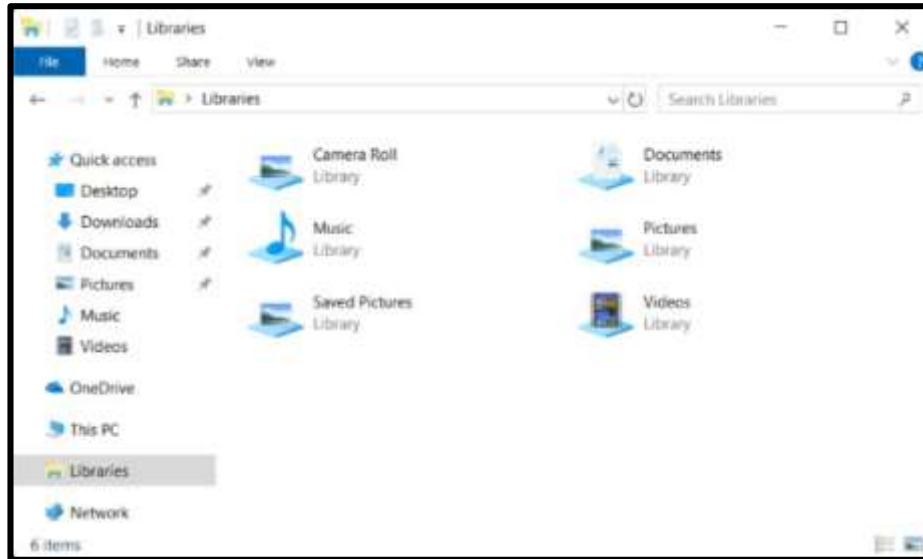
- Windows Libraries allow you to easily organize content including removable media, without actually moving the files.

- A library is a virtual folder that presents content from different locations within the same view.

- When Windows 10 is installed, each user has six default libraries, as shown in the figure.

- In Windows 10 and Windows 8.1, the libraries are hidden by default.

- Right-click the left pane of the File Explorer window for the context menu option that can show the libraries.

Directory Structures

C:\Users\Admin\Documents\Level 1\Level 2\Level 3
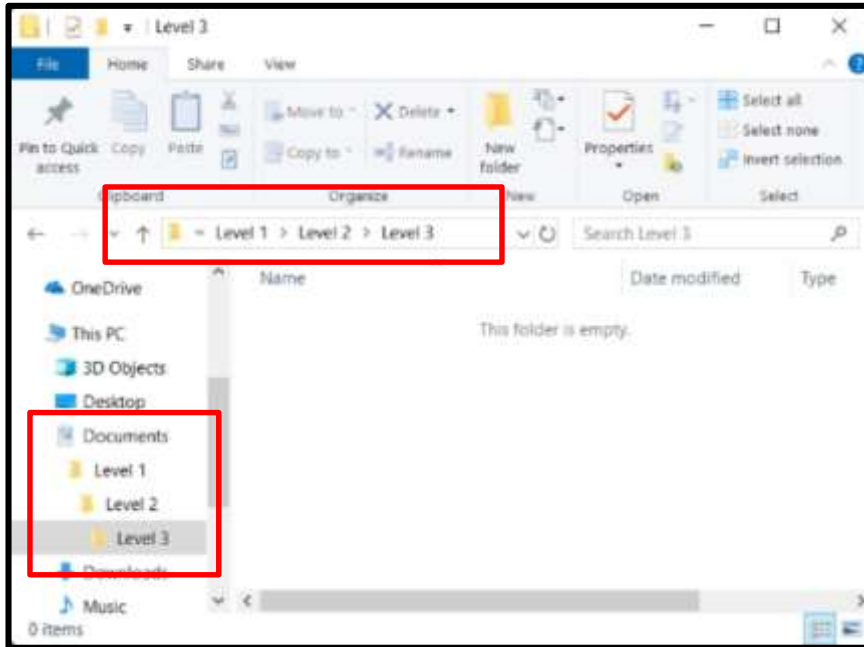
- The root level of the Windows directory structure, the partition, is usually labeled drive C.

- Directories may contain additional directories called subfolders.

- The number of nested folders is limited by the maximum length of the path to the folders.

- In Windows 10, the default limit is 260 characters.

- The figure shows several nested folders in File Explorer along with the equivalent path.
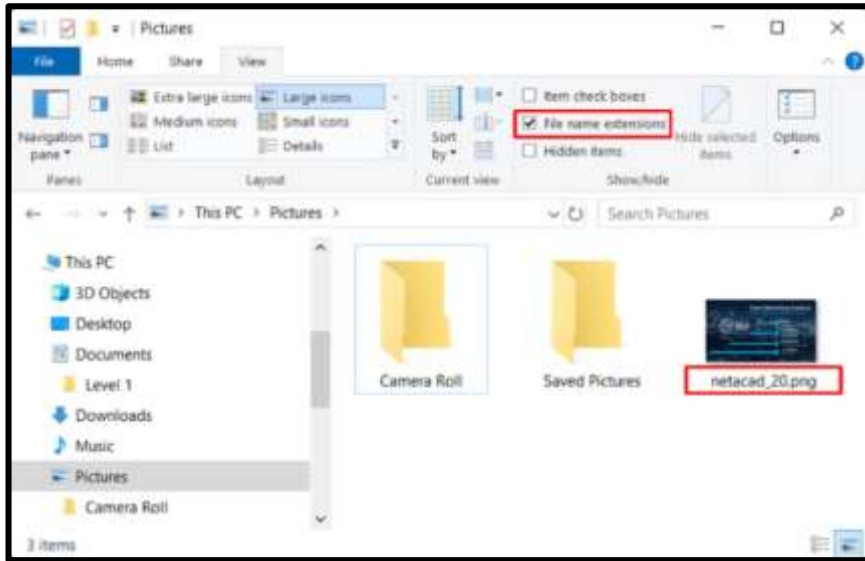
User and System File Locations

- **Users Folder** – Windows stores more of the files created by users in the Users Folder, C:\Users\User_name\.
- **System Folder** – Most files used to run a Windows OS computer are found in the folder C:\\Windows\system32.
- **Program Files** – This folder is used by most application installation programs to install software.

File Extensions
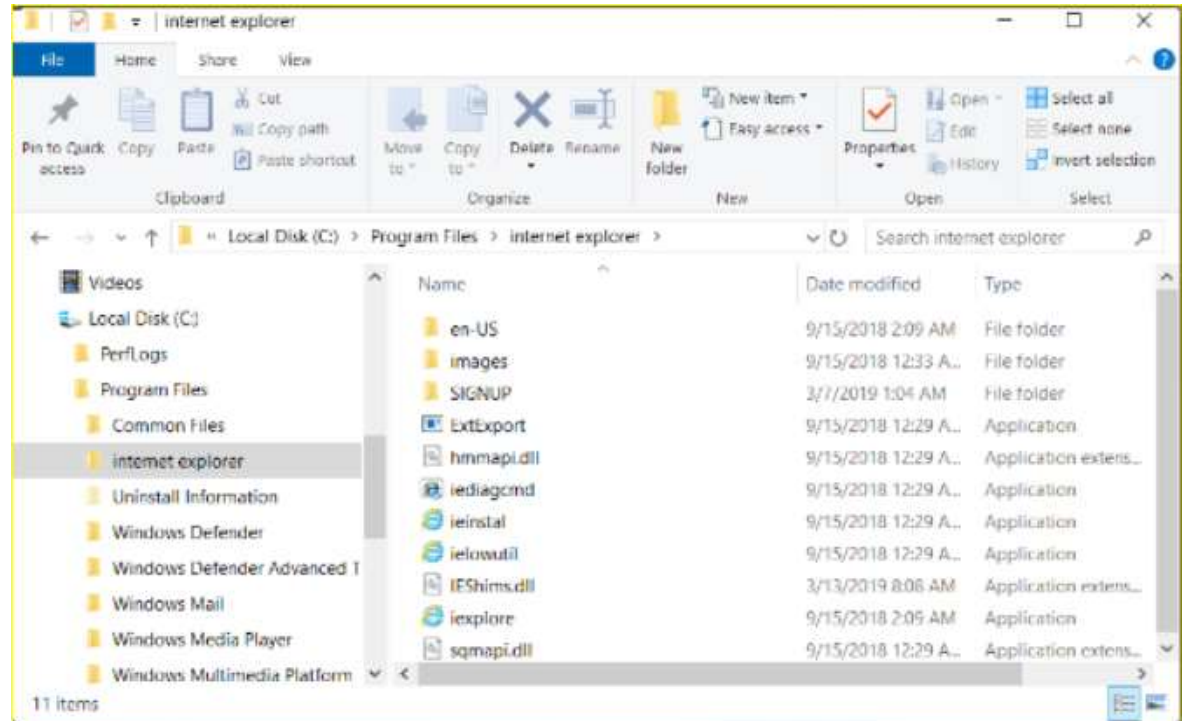
In Windows 10 and Windows 8.1 in the File Explorer ribbon, click the View tab. Then click to check File name extensions.

- Files adhere to the Windows naming convention:

  - A maximum of 255 characters is allowed

  - Characters such as a slash or a backslash (/ \) are not allowed

  - An extension of three or four letters is added to the filename to identify the file type

  - Filenames are not case sensitive

  - By default, file extensions are hidden

File Attributes

- These are the most common file attributes:

  - **R** - The file is read-only.

  - **A** - The file will be archived the next time that the disk is backed up.

  - **S** - The file is marked as a system file, and a warning is given if an attempt is made to delete or modify the file.

  - **H** - The file is hidden in the directory display.
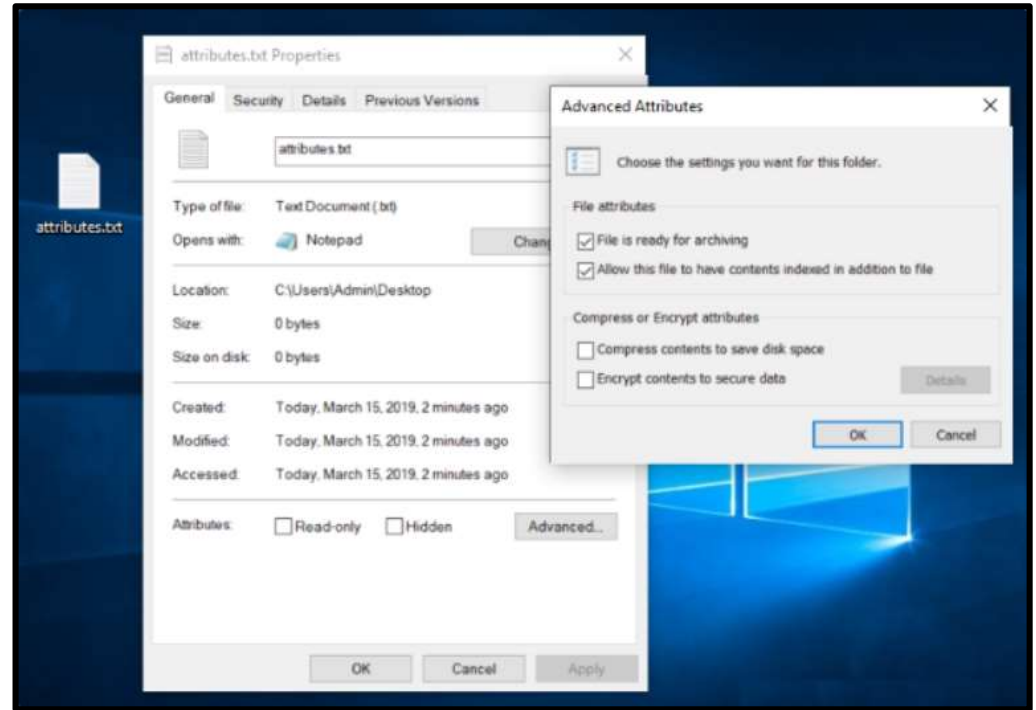
Video Explanation – Application, File, and Folder Properties

Video Demonstration: File and Folder Properties

In this video demonstration, you will learn about:

- File properties
- File security
- File details
- File previous versions
- Folder properties
- Folder sharing
- Folder security
- Folder previous versions
- Folder customization

0:02

Lab – Working with File Explorer

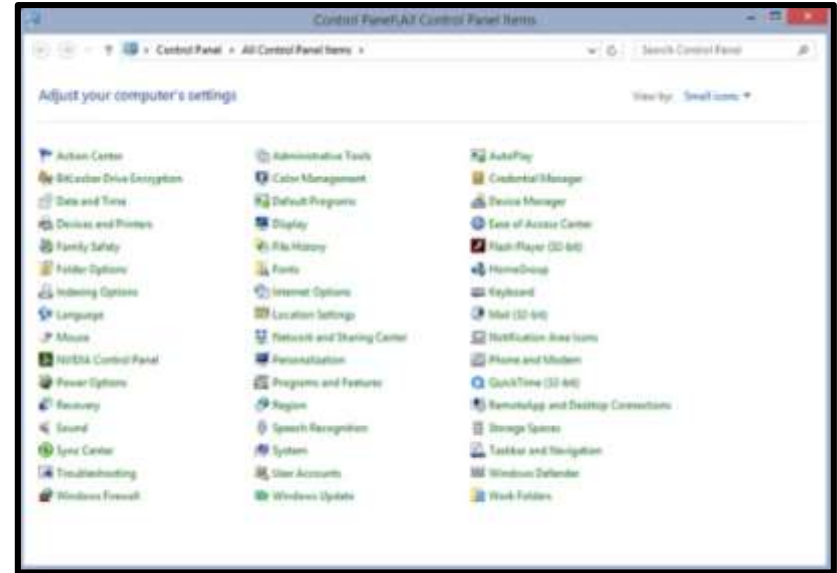In this lab, you will explore and use the File Explorer (Windows Explorer) to navigate the Windows file system.

11.2 Configure Windows with Control Panels

Windows 10: Settings and Control Panels

- Windows 10 offers two ways to configure the operating system

## The Settings app

The Control Panel

Introduction to Control Panel

- System Admins prefer the Control Panel to the Settings App.

- To start the Control Panel, type Control Panel into the Search box and click the Control Panel Desktop app that appears in the results.

- If you right-click on the result, you can pin it to the Start menu to make it easier to find.

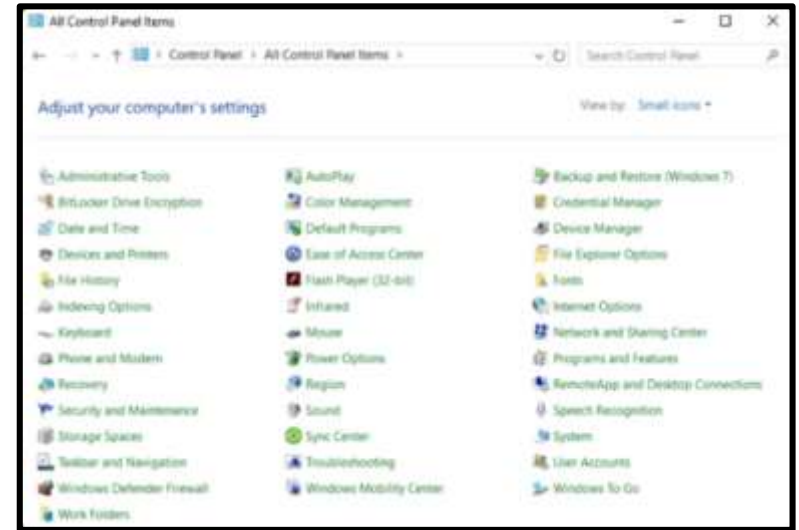- You can also open it from the Command Prompt by typing control.
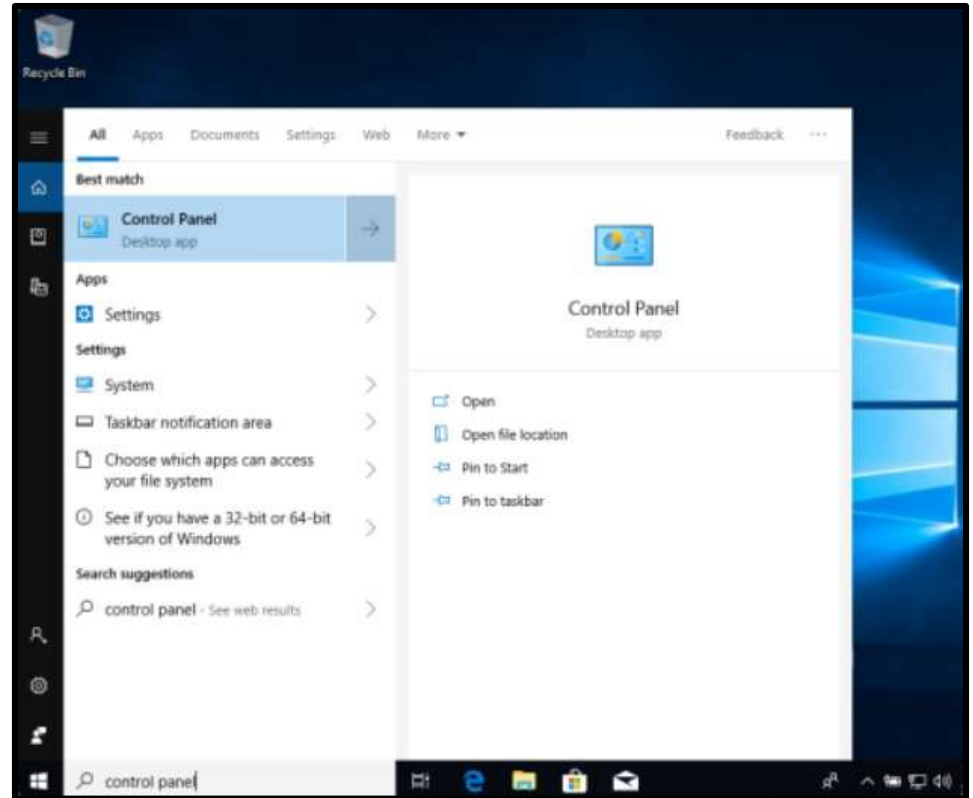
Control Panel Views

- The Windows 10 Control Panel opens to the Categories view by default

- Both views also provide a search box which will return a list of Control Panel items
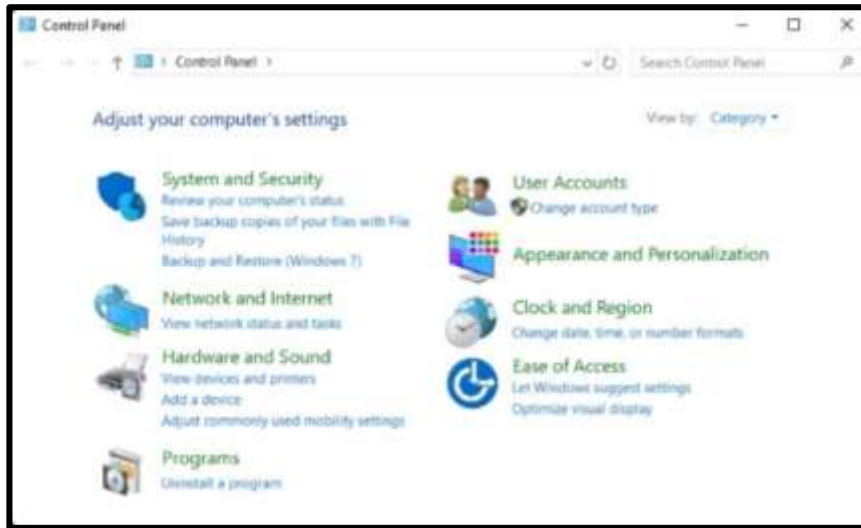

Category View

Small Icons View

Define Control Panel Categories

- **System and Security** – View and configure security settings such as Windows Defender Firewall.
- **Network and Internet** - Configure, verify, and troubleshoot networking and file sharing.
- **Hardware and Sound** - Configure devices such as printers, media devices, power, and mobility.
- **Programs** – Change installed programs and Windows updates, including removal.
- **User Accounts** – Administer Windows user accounts and user account control (UAC).
- **Ease of Access** - Access options that make Windows easier to use, especially for people who require accommodations for physical or perceptual challenges.
- **Clock and Region** – Configure time and date settings and formats.
- **Appearance and Personalization** – Configure taskbar and navigation, file explorer, and available fonts.

Lab – Explore Control Panel Categories

In this lab, you will investigate the options provided in the various commonly used Control Panel items.
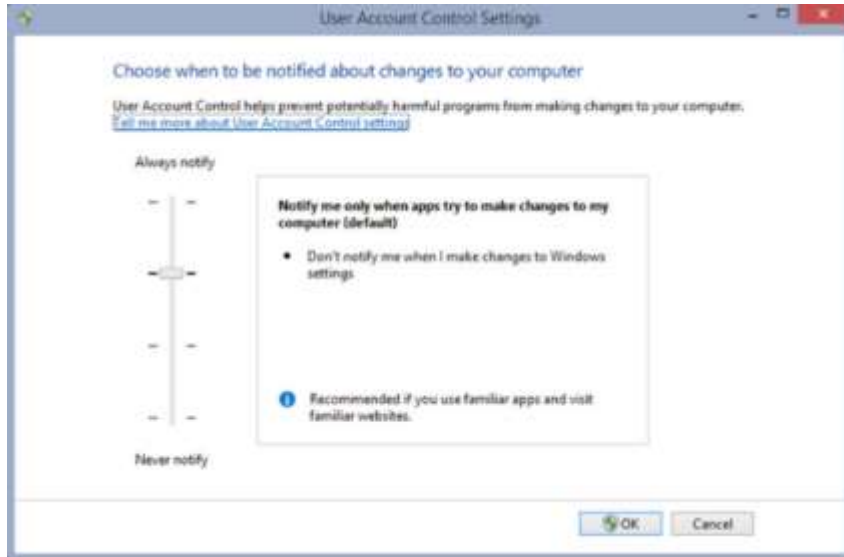
User Accounts
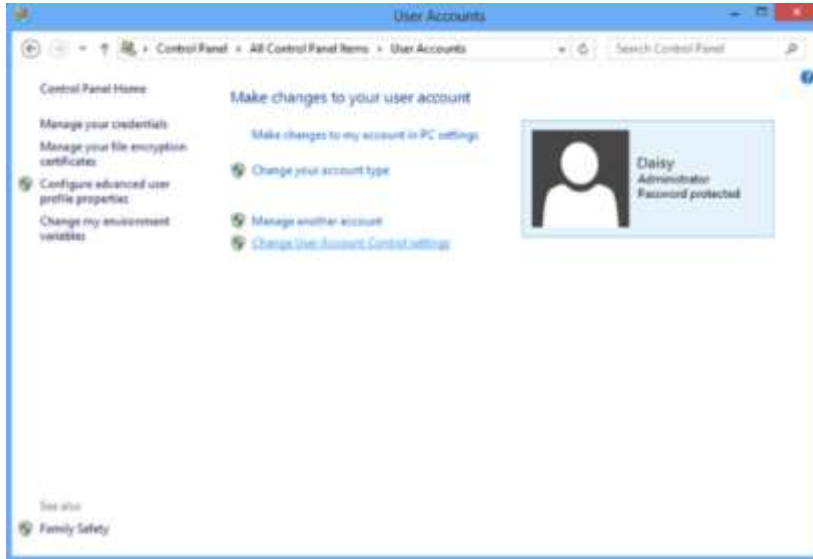
- The User Accounts Control Panel provides options to help you create, change, and delete user accounts.

- An administrative account is created when Windows is installed.

- To create a user account, open the User Accounts Control Panel.

- Standard user accounts can manage most configuration settings that don't affect other users.

- Standard user accounts can only access their own files and folders.

- Some features of the User Accounts utility require administrative privileges and will not be accessible with a standard user account.

User Account Control Settings

- The User Account Control (UAC) monitors programs on the computer and warns users when an action might present a threat to the computer.

- In Windows versions 7 through 10, you can adjust the level of monitoring that the UAC performs.

- The default UAC setting for the primary account is "Notify me only when programs try to make changes to my computer".

- Adjust the UAC level to change when you are notified about changes that programs may make to your computer.

Lab – User Accounts

In this lab, you will work with User Accounts Control Panel item create and modify users.

Credential Manager
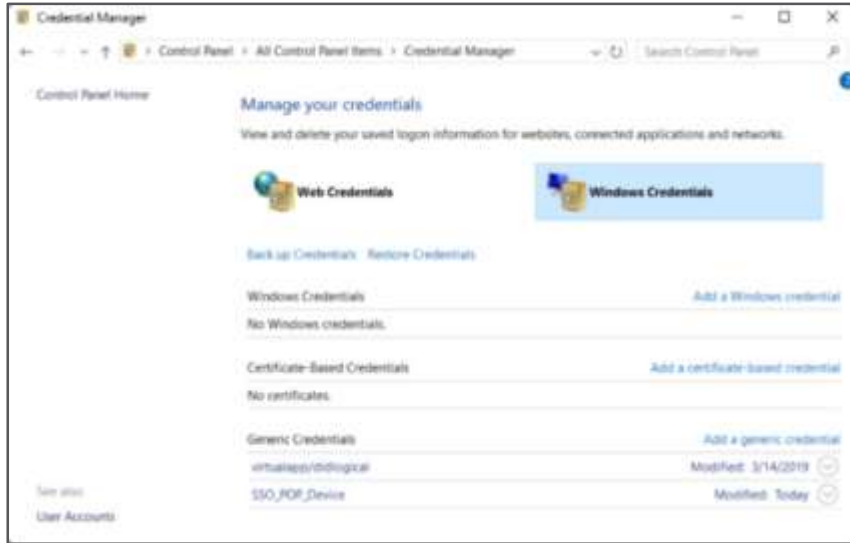
- Credential Manager helps you to manage passwords that are used for websites and Windows applications.

- These passwords and usernames are stored in a secure location.

- You can view, add, edit, or delete the credentials that are stored by Credential Manager.

- Web credentials are not saved for sites accessed by browsers other than Internet Explorer and Edge.
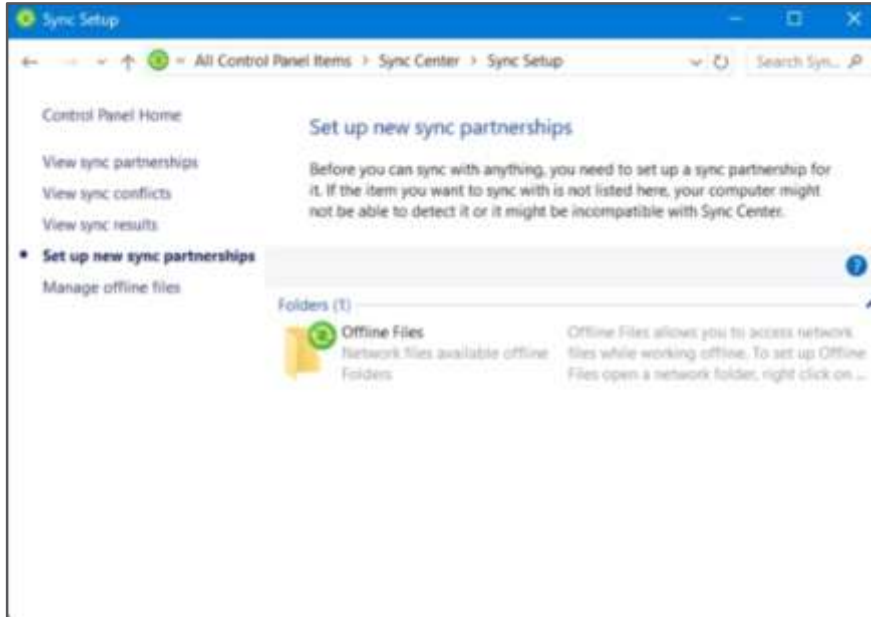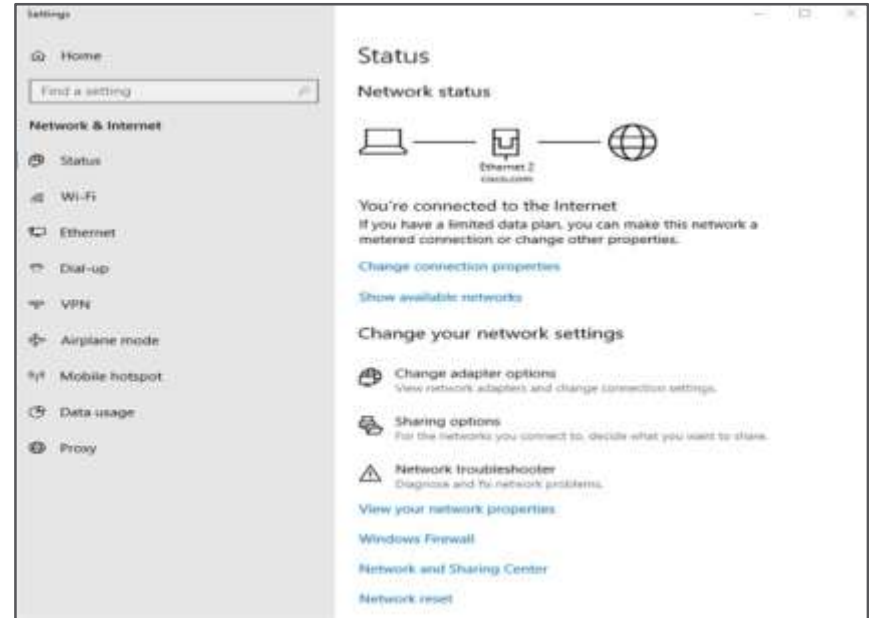
Sync Center

- Sync Center allows files to be edited from multiple Windows devices.

- Sync Center allows a form of version control.

- Using Sync Center requires activation of the Offline Files feature. This sets up a local file location that will store the files to be synchronized. It also requires you to set up a sync partnership with the networked file location.

- Files can be synchronized manually and synchronization can also be scheduled to occur automatically.

- Microsoft OneDrive offers a similar service. OneDrive is a cloud storage service that is available to Microsoft Windows users.

# Network Settings

- The Network Status app in Windows 10 combines many different functions into one high-level app.

- The Network Status App links to various other Settings App screens.

- It also links to Control Panel items like the Network and Sharing Center.

- Some of the options, such as Airplane Mode, Mobile Hotspot, and Data Usage are more relevant to mobile devices than to desktop computers.
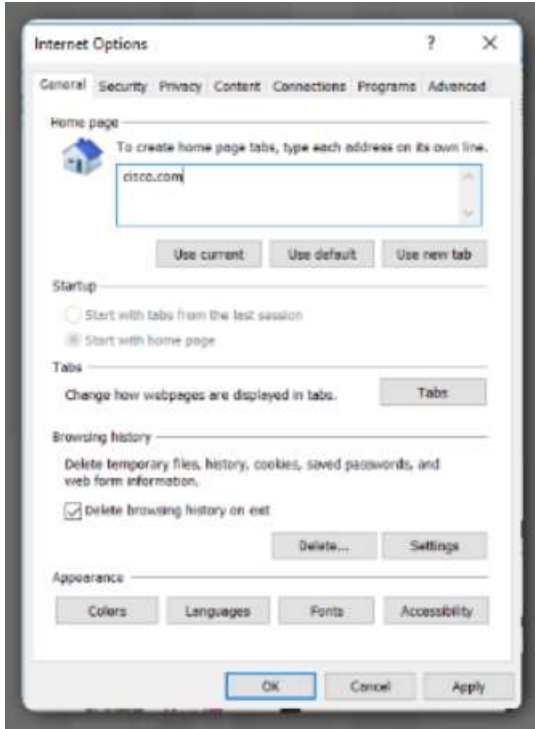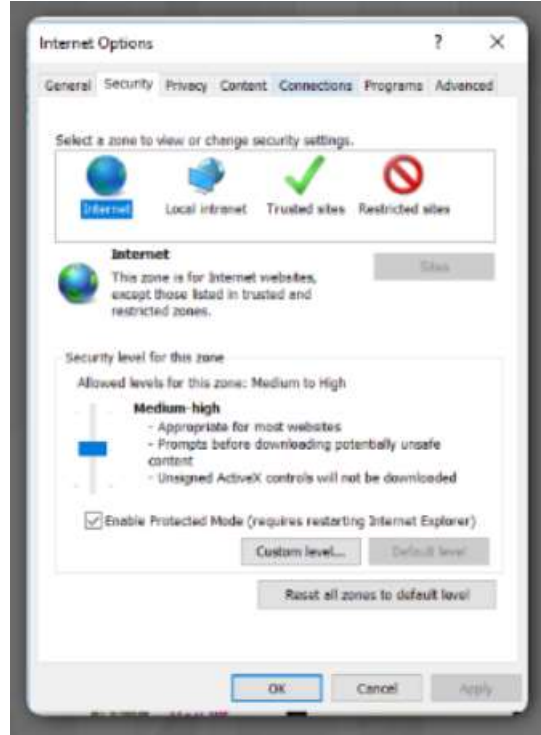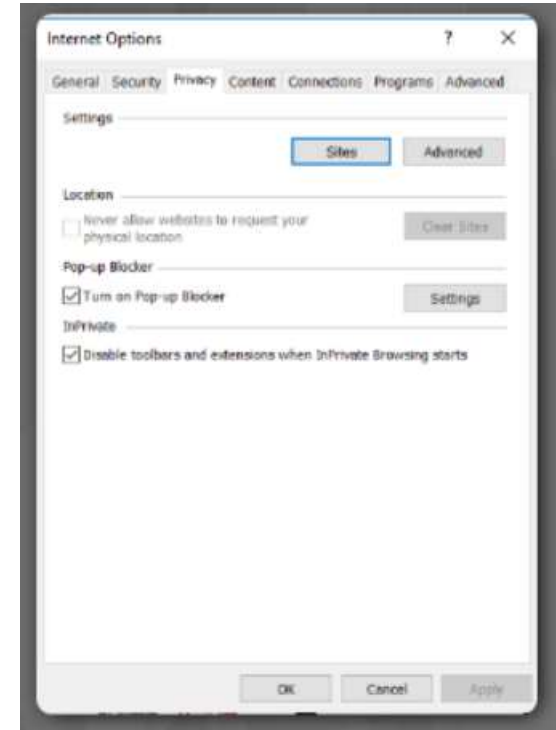
Internet Options

- General Tab

- Security Tab

- Privacy Tab

Internet Options (Cont.)
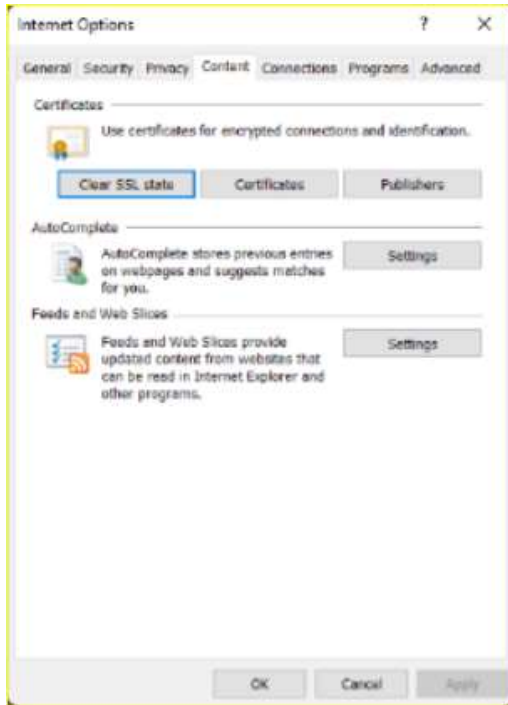
- Content Tab
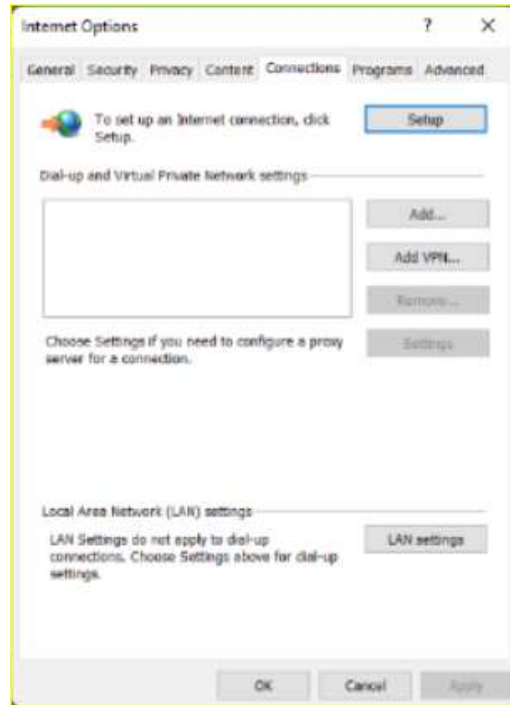
- Connections Tab
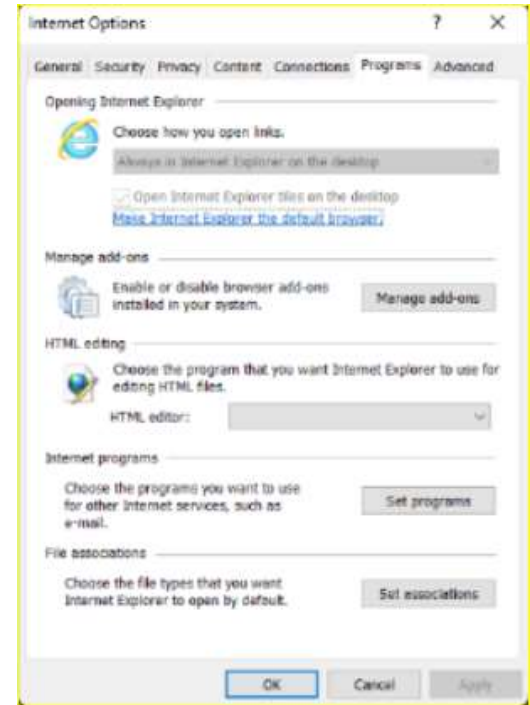
- Programs Tab

Internet Options (Cont.)
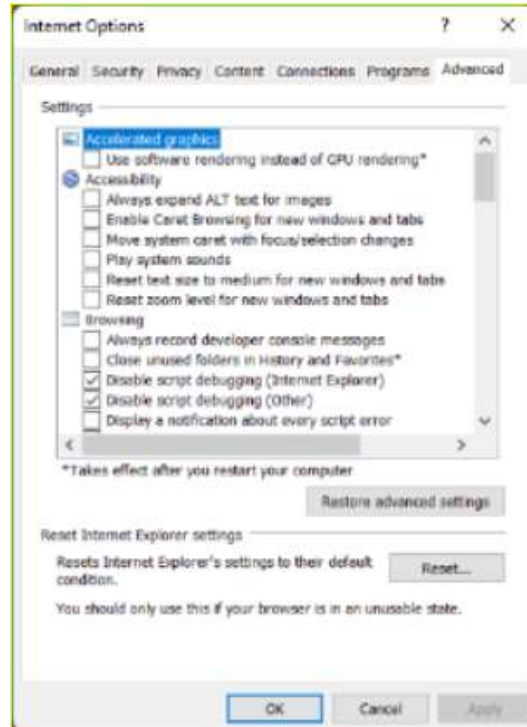
- Advanced Tab

Network and Sharing Center

- Network and Sharing Center allows an administrator to configure and review nearly all network settings on a Windows computer.

- View network status and internet connectivity.

- Change properties of protocols and services running on a network adapter.

- Configure file and device sharing through the use of network profiles.

- Network profiles enable basic sharing settings to change depending on whether it is a private or public network. This enables sharing to be inactive on an insecure public network but active on a private secure network.
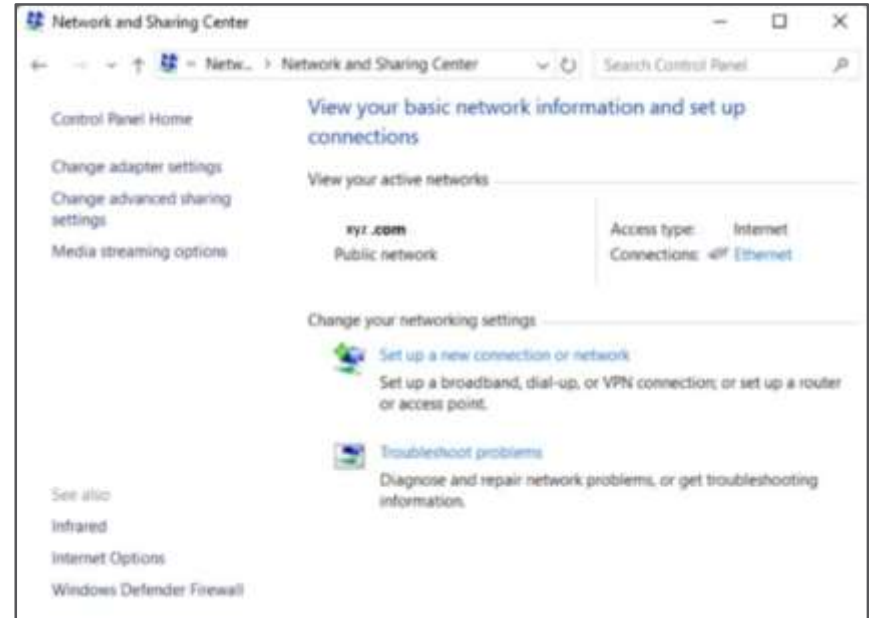
Windows 10
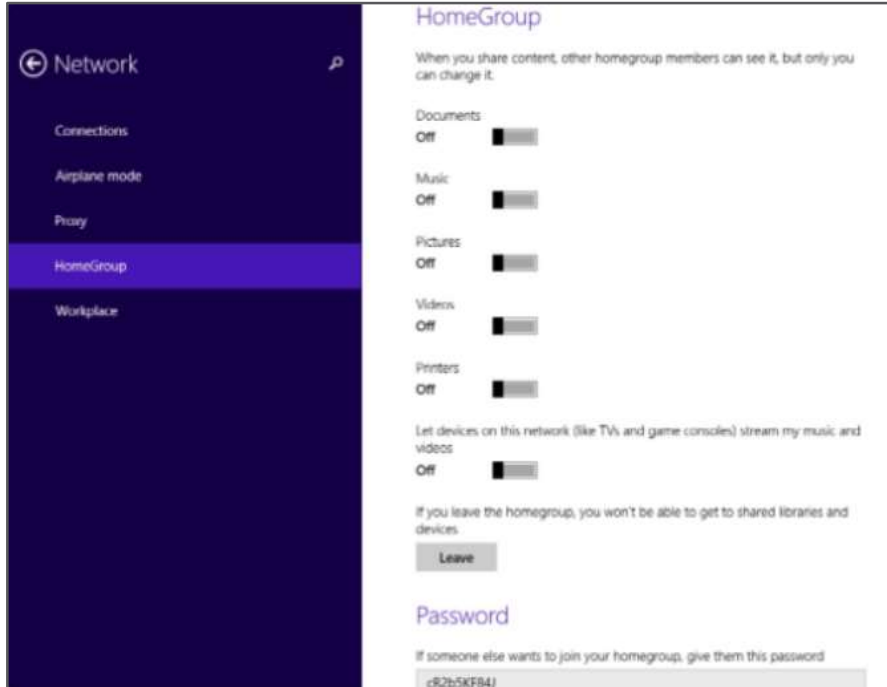
HomeGroup

- Homegroups simplify sharing files on simple networks.

- They are intended to make networking in the home easier by requiring a minimum of configuration.

- You can share your library folders on the network, making it easy for other devices to access your music, videos, photos, and documents.

- Users will need the homegroup password in order to join the homegroup and access shared resources..

- Homegroups were used in Windows 7 and 8 but Microsoft has been phasing out the homegroup functionality.

- In Windows 8.1 homegroups cannot be created, however Windows 8.1 computers can join existing home groups.

- In newer versions of Windows 10 (version 1803 and higher), home group functionality is not available.

Lab – Configure Browser Settings

In this lab, you will configure browser settings in Microsoft Internet Explorer.

Display Settings and Configuration

- The Windows 10 display settings are reached by right-clicking an empty area of the desktop and selecting Display settings from the context menu.

- Change the appearance of the desktop by modifying the resolution that is output by the graphics adapter.

- If the screen resolution is not set properly, you might get unexpected display results from different video cards and monitors.

- You can also change the magnification of the desktop and text size in Windows interface elements.
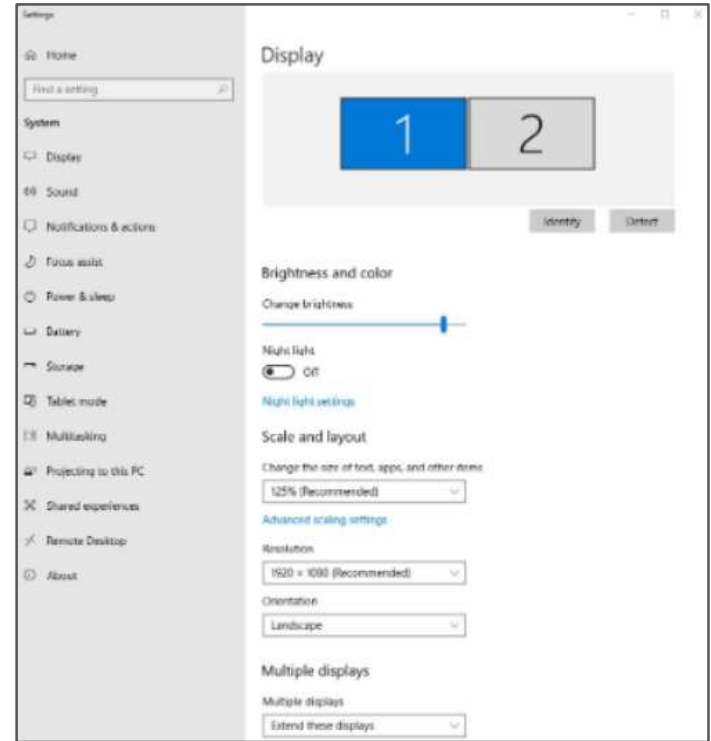
Display Settings in Windows 10

Display Features

- Windows 8 and 7 Display control panel item:

- **Display** - configure multiple monitors

- **Screen resolution** - number of pixels horizontally and vertically. Higher numbers provides better resolution, 1920 x 1080 for example

- **Orientation** - This determines whether the display appears in Landscape, Portrait, flipped Landscape, or flipped Portrait orientation

- **Refresh rate** - how often the screen image is redrawn expressed in Hertz (Hz). The higher the refresh rate, the steadier the screen image appears

- **Display colors** - The higher the bit depth, the greater the number of colors.

- **Multiple displays** - two or more monitors attached to the same computer. The desktop can be extended to make one large display, or mirrored, with the same image shown on all displays

Power Options
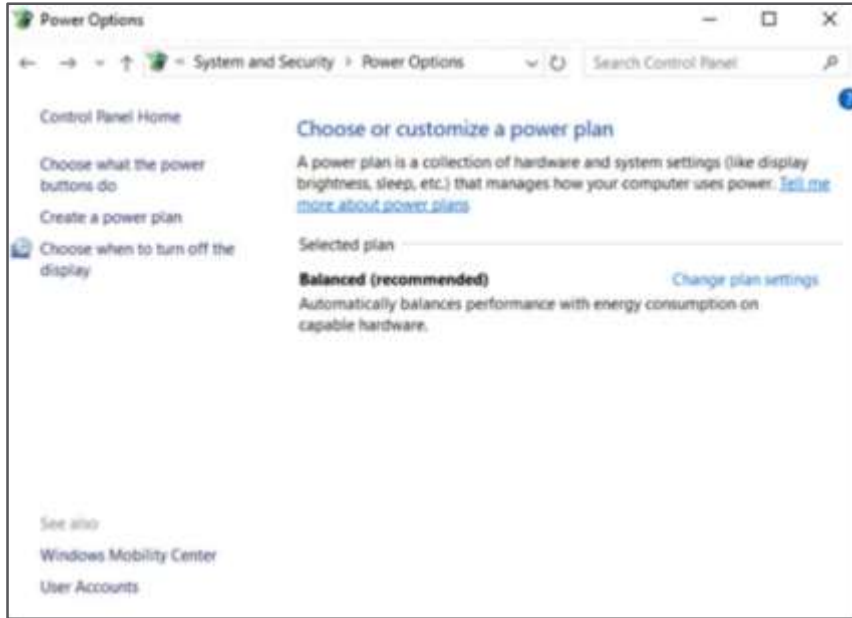
Power Options Control Panel in Windows 10

- Power Options Control Panel allows you to change the power consumption of certain devices or the entire computer.

- Use Power Options to maximize battery performance or conserve energy by configuring a power plan.

- One important difference from Windows 7 and 8 is that the setting that requires a password when the computer wakes has been moved from Power Options to User Accounts in Windows 10. This is an important setting for data security.

- Windows has preset power plans. Use the default settings or create your own customized plans.

- Note: Power Options settings will vary based on the hardware that is detected.

Power Options Settings

- In Windows 8 you can choose from the following options:

  - Require a password on wakeup (Windows 7 and 8 only)

  - Choose what the power buttons do

  - Choose what closing the lid does (for laptops only)

  - Create a power plan

  - Choose when to turn off the display

  - Change when the computer sleeps
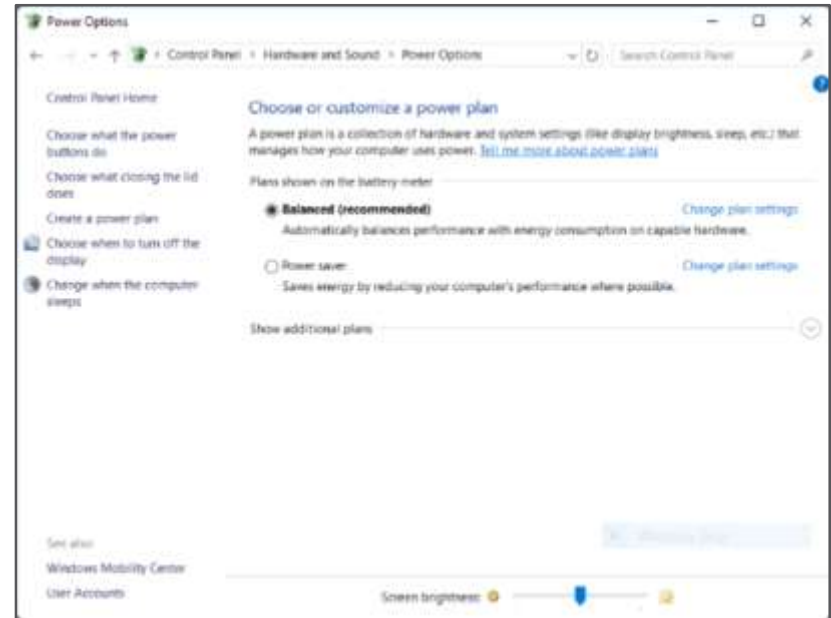
Power Options Actions
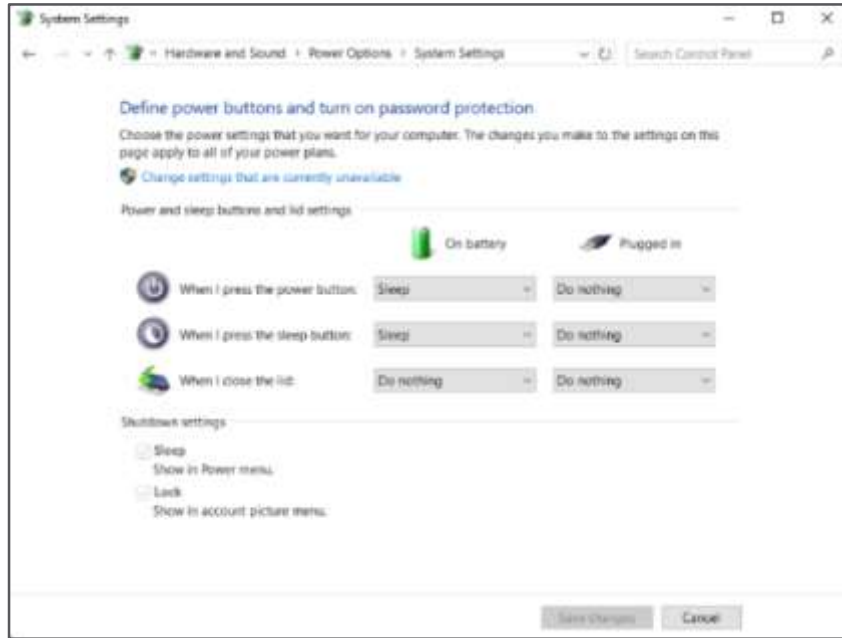
- If users do not want to completely shut down a computer, the following options may be available:

  - **Do nothing** - The computer continues to run at full power.

  - **Sleep** – Documents, applications, and the state of the OS are saved in RAM. This allows the computer to power on quickly.

  - **Hibernate** – Documents, applications, and the state of the OS are saved to a temporary file on the hard drive. With this option, the computer takes a little longer to power on than the Sleep state, but does not use any power.

  - **Turn off the display** - The computer operates at full power. The display is turned off.

  - **Shut down** - Shuts down the computer.

System Control Panel Item
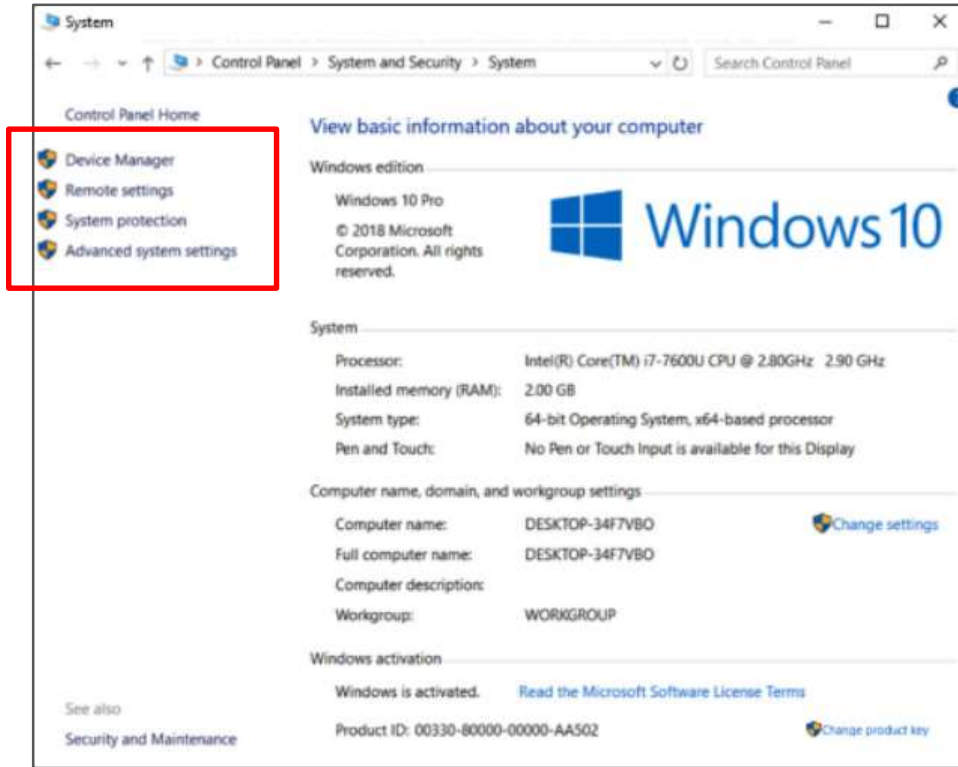
- The System Control Panel item allows all users to view basic system information, access tools, and configure advanced system settings.

- The Windows 10 System Control Panel item is shown here. The System Control Panel item is very similar in Windows 7 and 8.

- The various settings can be accessed by clicking the links on the left panel.

System Properties

- **Computer Name** – View or change the computer name, workgroup, or domain

- **Hardware** – Access the Device Manager or adjust the device installation settings

- **Advanced** – Configuration settings for performance, user profiles, startup and recovery

- **System Protection** – Access system restore and enable system restore points and the amount of disk space to store them

- **Remote** – Adjust settings for remote assistance and remote desktop
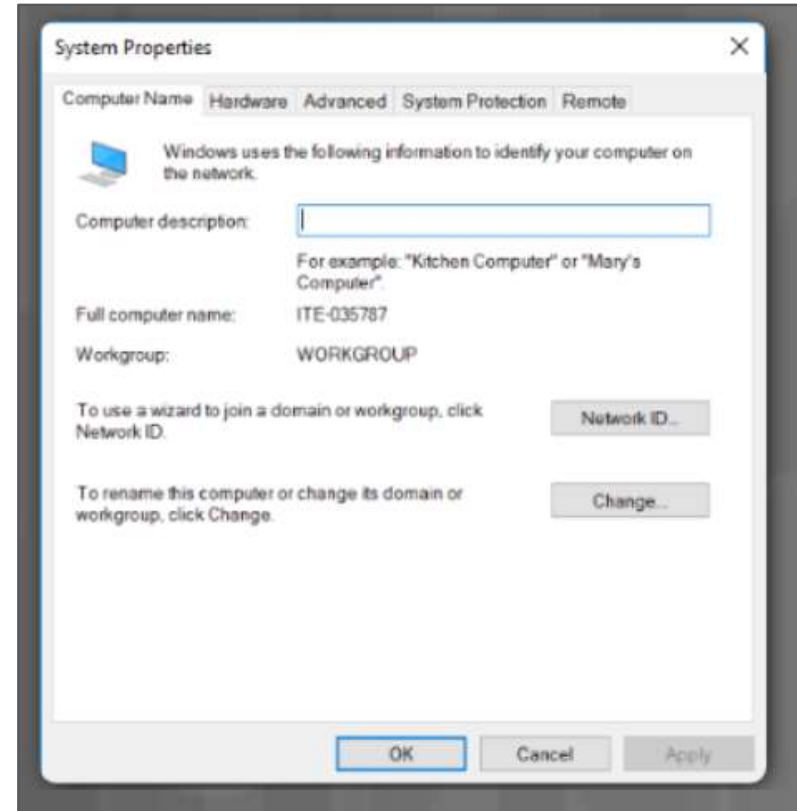
Increasing Performance

- To enhance the performance of the OS, you can change the virtual memory configuration settings, as shown in the figure.

- When Windows determines that system RAM is insufficient, it will create a paging file on the hard drive that contains some of the data from RAM.

- This process is much slower than accessing RAM directly. If a computer has a small amount of RAM, consider purchasing additional RAM.

- Another form of virtual memory is the use of an external flash device and Windows ReadyBoost to enhance system performance.
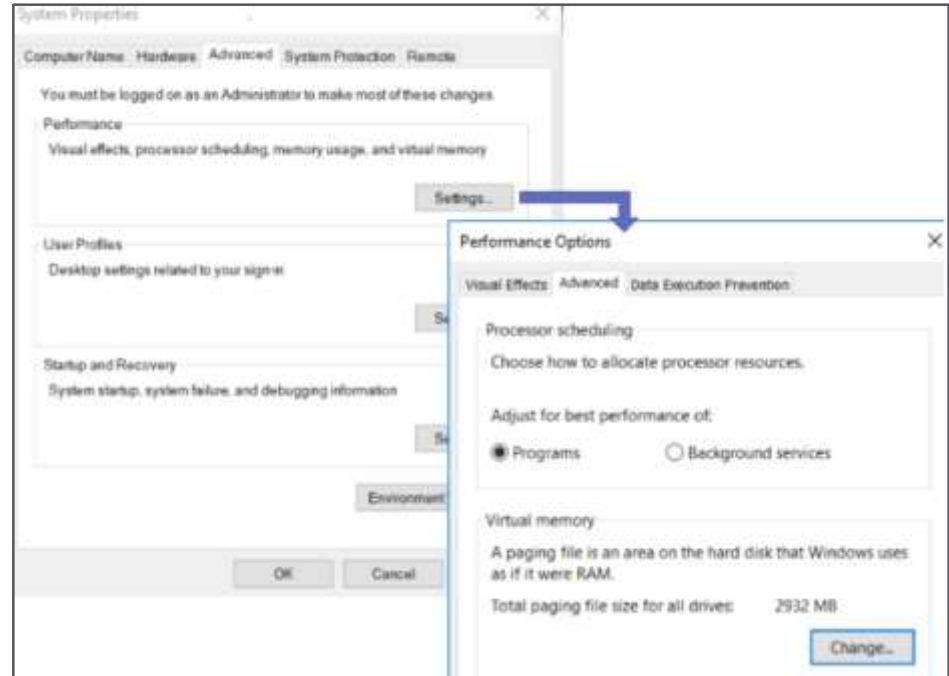
Lab – Manage Virtual Memory

In this lab, you will use the System Control Panel item to configure and manage virtual memory.

Device Manager

- Device Manager displays a list of all the devices installed in the computer, allowing you to diagnose and resolve device problems.

- The Device Manager utility uses icons to indicate the types of problems that may exist with a device.

  - **Update a driver** - Change the currently installed driver.

  - **Roll back a driver** - Change the currently installed driver to the previously installed driver.

  - **Uninstall a driver** - Remove a driver.

  - **Disable a device** - Disable a device.
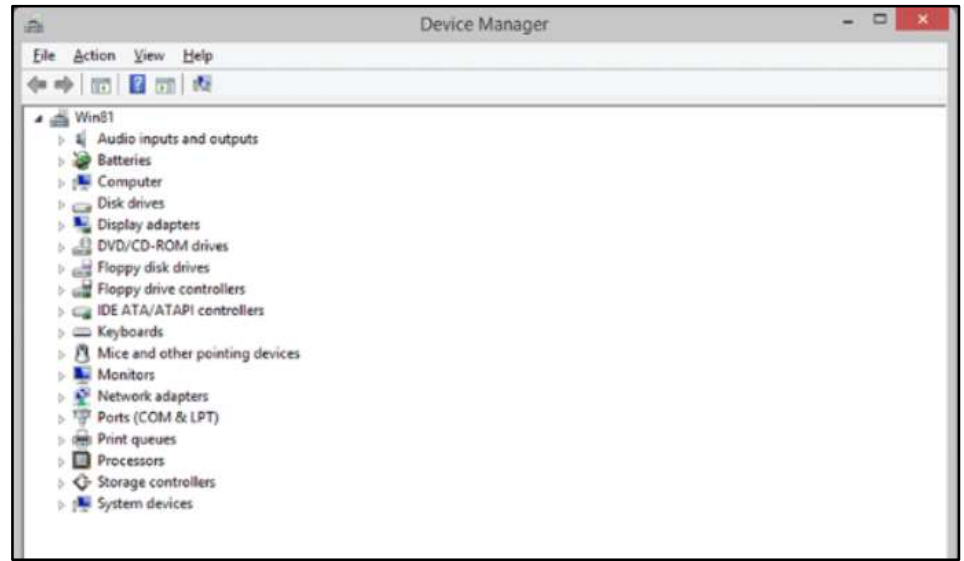
Device Manager Status Icons	
Device Manager Icon	**Meaning**
⚠	The device has an error. It may be functioning, but requires attention. Right-click on the item in Device Manager and select Properties to see the problem code in the Device status error of the properties box. The code can be researched to determine the problem.
⬇	The device is disabled. The device is installed on the system, but no driver is loaded for it.
? or 🆔	The device-specific driver for the device is not available. A compatible driver is in use.
ⓘ	This is not a problem code. It means that a driver has been manually, rather than automatically, installed for the device.

Lab – Use Device Manager

In this lab, you will open Device Manager to display devices listed on your computer. You will also display the monitor settings.

Devices and Printers
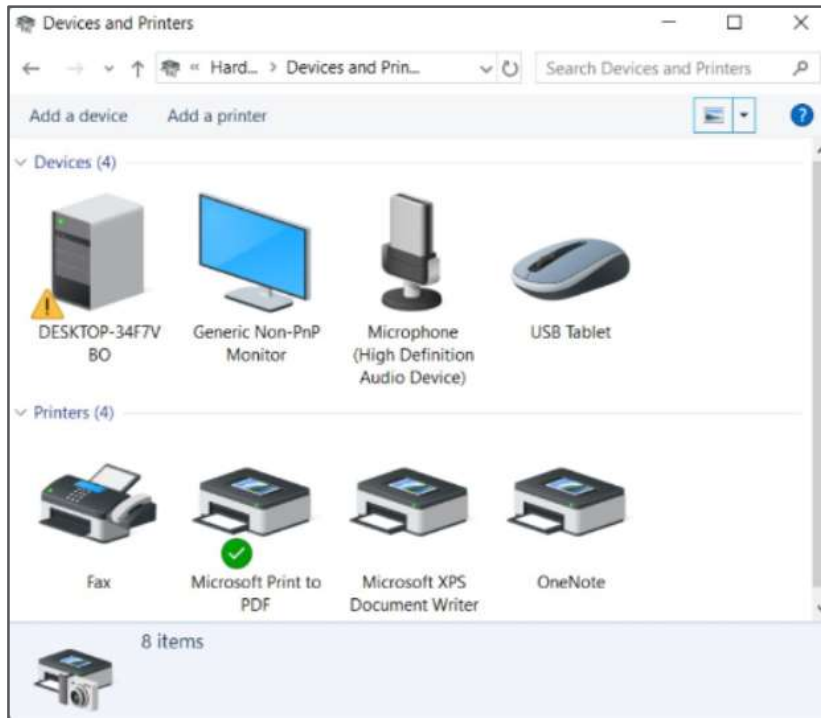
- Devices displayed in the Devices and Printers Control Panel item are typically external devices you can connect to your computer through a port such as USB, or a network connection.

- Devices and Printers also allows you to quickly add a new device to the computer.

- In most cases, Windows will automatically install any necessary drivers that are required by the device.

- Note that the desktop computer device in the figure shows a yellow triangle alert, indicating that there is a problem with the driver.

- The green check mark next to a device indicates that is to be used as the default device.

- Devices and Printers is very similar in Windows versions 7, 8, and 10.

Sound

- Use the Sound Control Panel item to configure audio devices or change the sound scheme of the computer.

- For example, you can change the email notification sound from a beep to a chime.

- Sound also allows a user to choose which audio device is to be used for playback or recording.

- The Sound Control Panel utility is largely unchanged between Windows 7, 8, and 10.
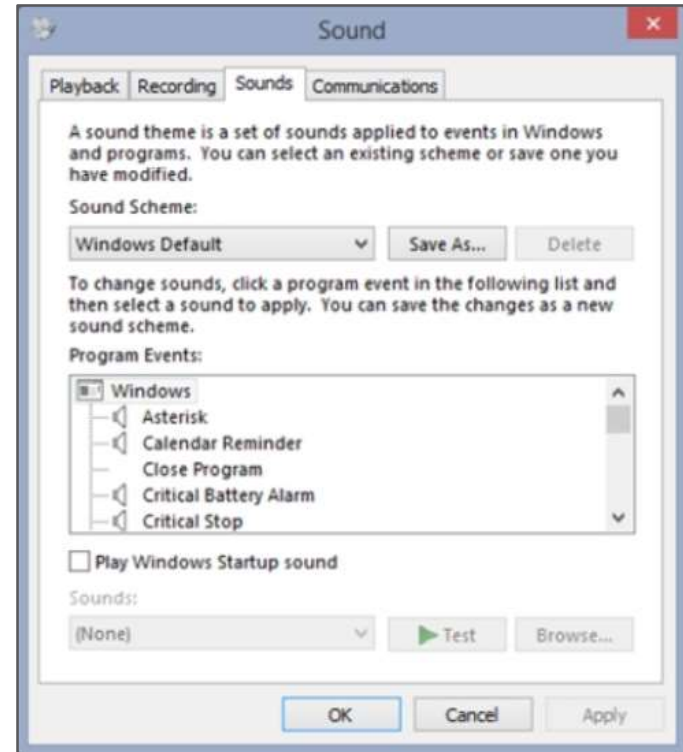
Clock

- Windows allows you to change the system time and date through the Date and Time control panel item, as shown in the figure.

- You can also adjust your time zone.

- Windows will automatically update the time settings when time changes occur.

- The Windows clock will automatically synchronize with a time authority on the internet. This ensures that the time value is accurate.

- Time and Date is accessed through the Clock and Region Control Panel category in Windows 10. In Windows 7 and 8, it is accessed through the Clock, Language, and Region Control Panel category.
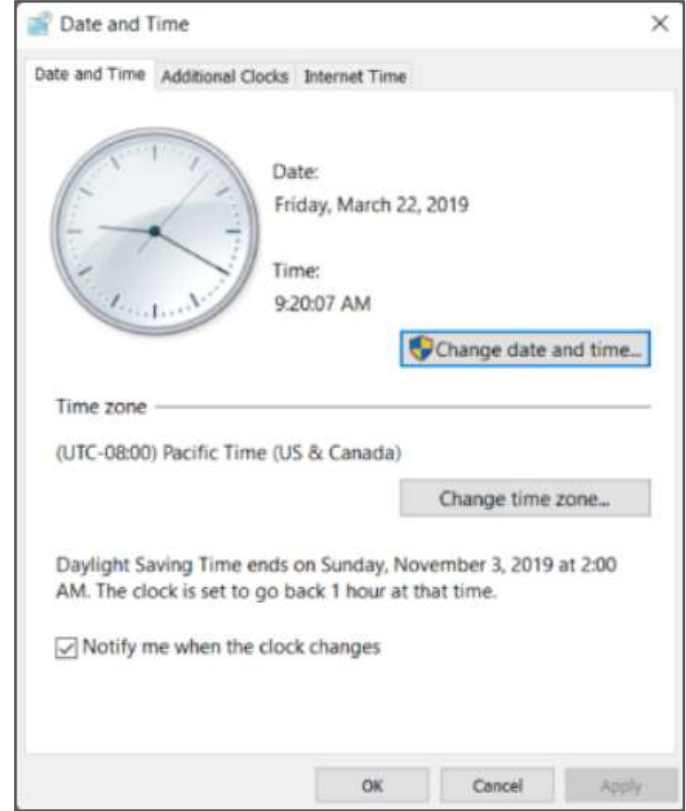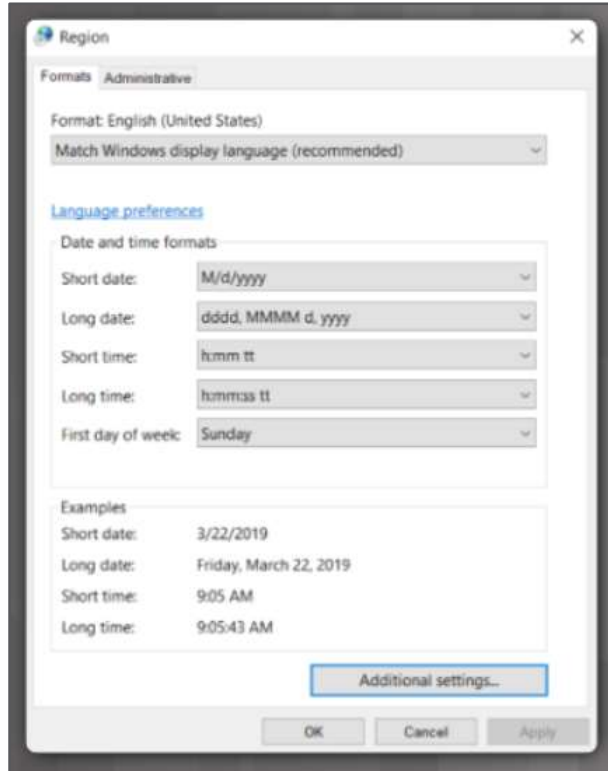
Region

- Windows allows you to change the format of numbers, currencies, dates, and times by using the Region Control Panel item.

- Windows 10 attempts to use location services to automatically detect the location of the computer. The location can also be set manually if the location can't be determined.

- Date and time setting formats can be changed by changing the display patterns available in the Date and Time formats area.

- Click Additional settings to change number and currency formats and the measurement system used in the region.

- Additional date and time formats are also available.

Language

- In Windows 7 and Windows 8, language can be configured through Control Panel items. This allowed users to install language packs that included fonts and other resources required by different languages.

- In Windows 10, this was moved to the Region settings app, shown in the figure. When adding a language, you can even choose to install Cortana support for voice commands in that language, if available.
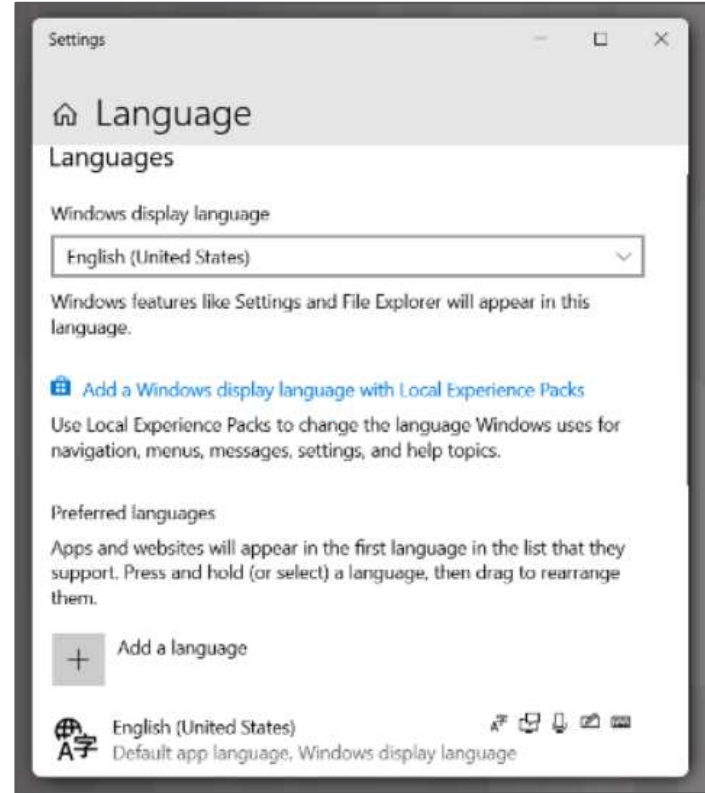
Lab – Region and Language Options

In this lab, you will examine region and language options in Windows.

Programs

- Use the Program and Features Control Panel items to uninstall a program from your computer.

- It is important that applications be uninstalled either through the Programs and Features Control Panel item or from an uninstallation menu choice that is associated with the application in the Start menu.

- In addition, you can repair the installation of some programs that may have problems.

- You can troubleshoot problems with programs that were made for older versions of Windows.

- Finally, you can choose to manually install software from the network.
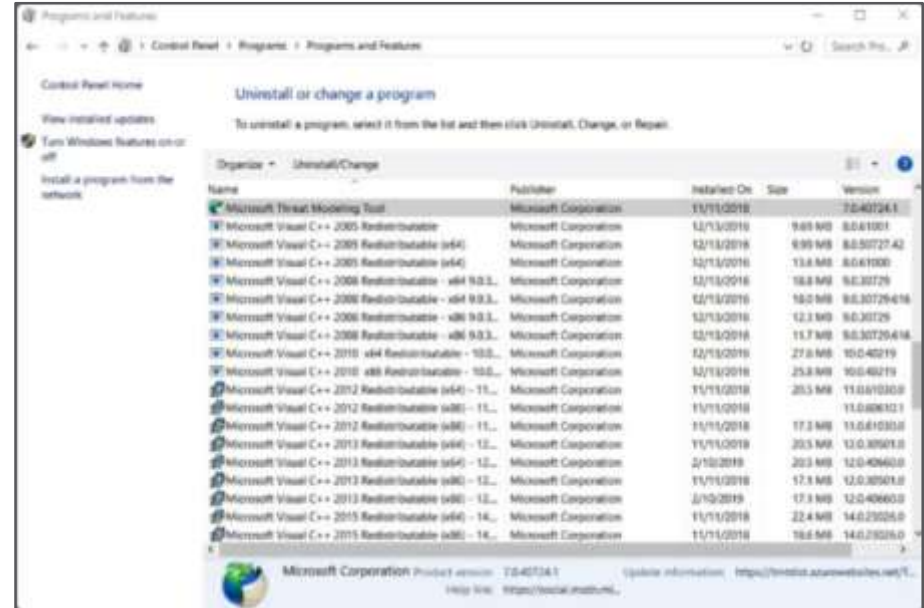
Windows Features and Updates

- You can also activate or deactivate Windows features, as shown in the figure.

- Programs and Features also allows you to view the Windows updates that have been installed, and uninstall specific updates if they are causing problems and don't have dependencies with other installed updates or software.
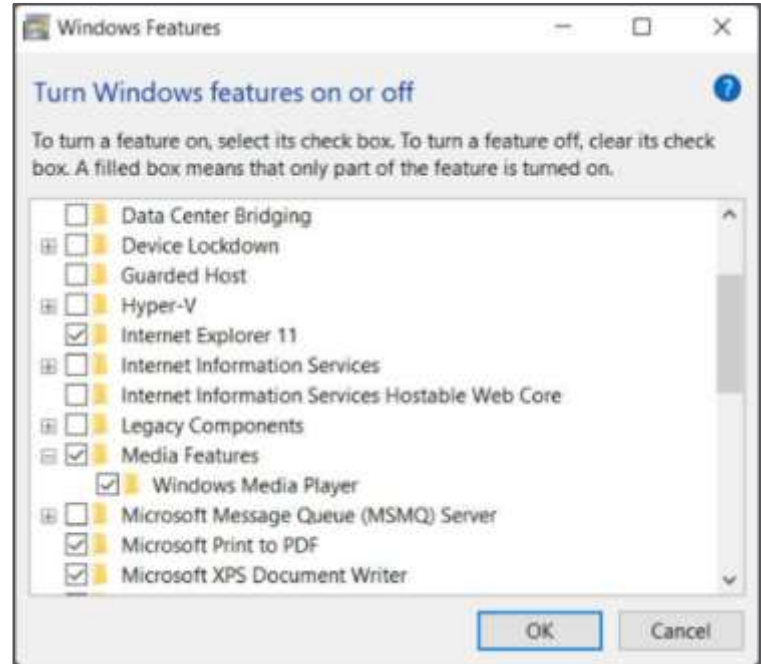
Default Programs

- The Default Programs Control Panel item provides the means to configure the way that Windows handles files and the applications that are used to work with them.

- Example: if you have multiple web browsers installed, you can choose which web browser will open to view a link that you have clicked on in an email or other file.

- Choose default applications, or which application opens for a specific file type.

- For example, you can configure a JPEG graphics file to open in a browser, for viewing, or in a graphics editor.
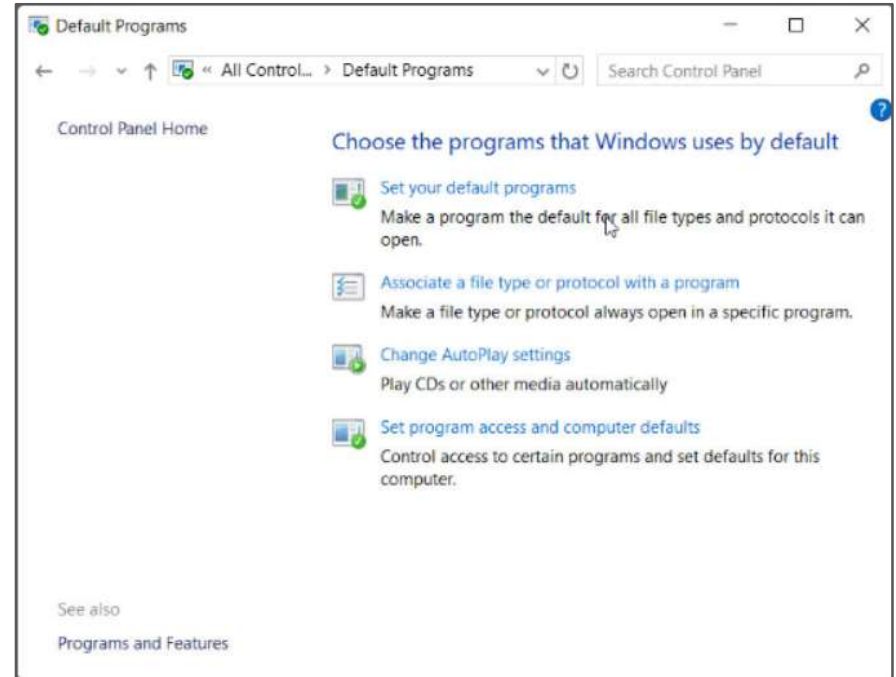
Troubleshooting

- The Troubleshooting Control Panel item has a number of built-in scripts that are used to identify and solve common problems with many Windows components.

- The scripts run automatically and can be configured to automatically make the changes to fix the problems that are found.

- You can also view when the troubleshooting scripts have been run in the past by using the View History feature.
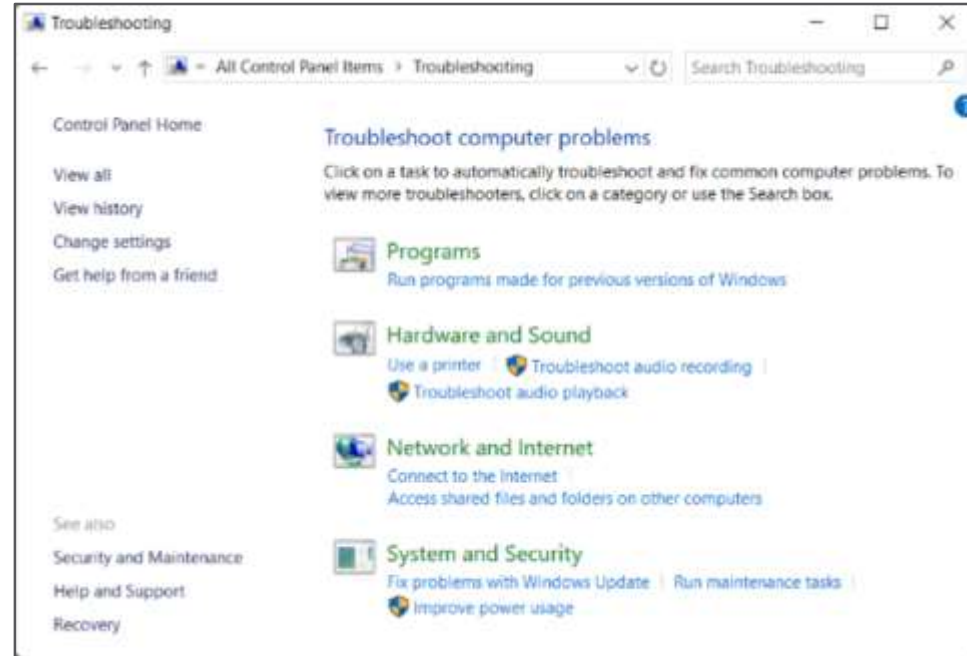
BitLocker Drive Encryption
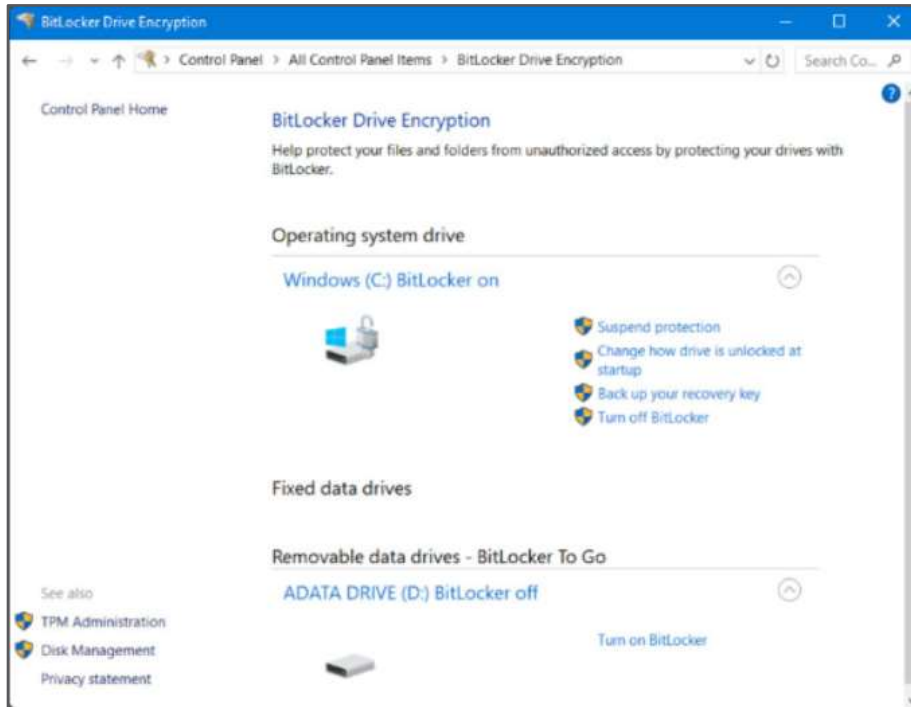
- BitLocker is a service provided with Windows that will encrypt an entire volume of disk data so that it can't be read by unauthorized parties.

- Data can be lost if your computer or disk drives are stolen.

- In addition, when the computer is taken out of service, BitLocker can help insure that the hard drive can't be read when it has been removed from the computer and scrapped.

- The BitLocker Control Panel item enables you to control the way BitLocker operates.

File Explorer and Folder Options
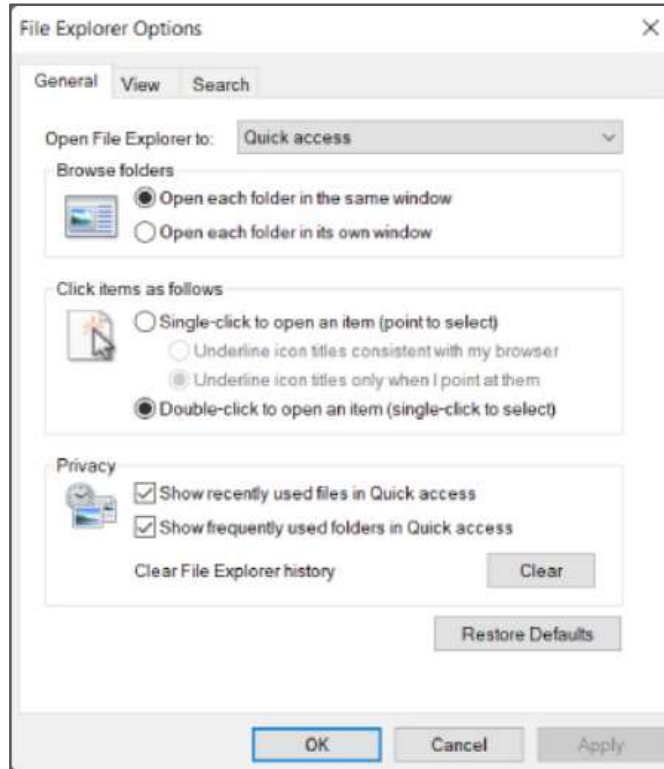
- File Explorer Options in Windows 10 permit changing a variety of settings regarding the way files are displayed in Windows Explorer or File Explorer.

- Folder Options in Windows 7 and 8 is very similar.

- In Windows 10, many of the most commonly used file and folder options can be found in the File Explorer ribbon.

- In Windows 8.1 some functions are present in the ribbon, but the selection is not as comprehensive as it is in Windows 10.

- In Windows 7, there is no ribbon, so the Control Panel must be used.

11.3 System Administration

Administrative Tools Control Panel Item
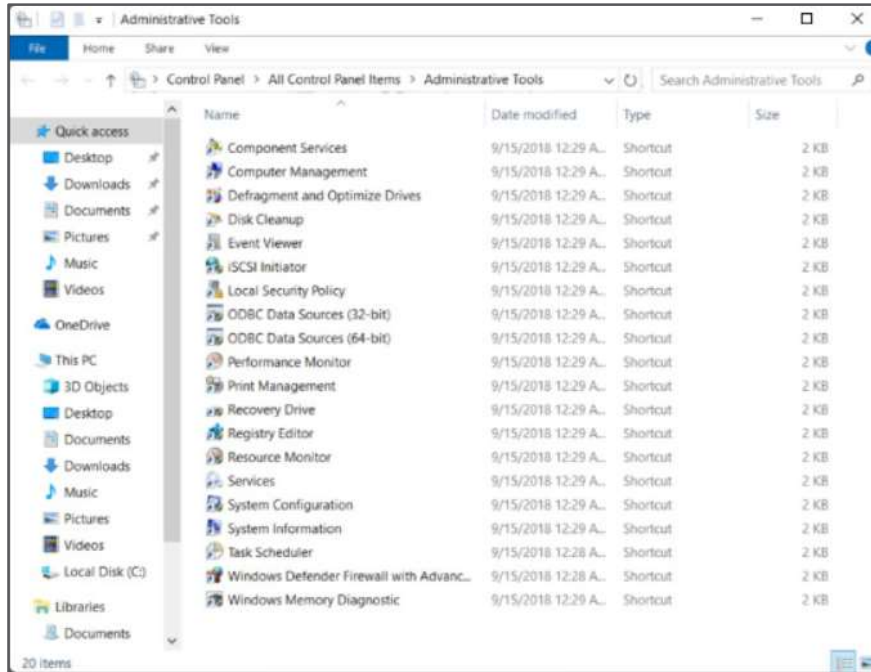
- The Administrative Tools Control Panel item is a collection of tools that are used to monitor and configure Windows operation.

- This Control Panel item has evolved over time. In Windows 7 it was somewhat limited.

- Microsoft added many different utilities in Windows 8.1.

- In Windows 10, the available tools changed slightly.

- The Administrative Tools Control Panel item is unusual in that it is a collection of shortcuts to an application.

Computer Management

- One of the Administrative Tools items is the Computer Management console.

- It allows you to manage many aspects of your computer and remote computers in one tool.

- The Computer Management console provides access to three groups of utilities.
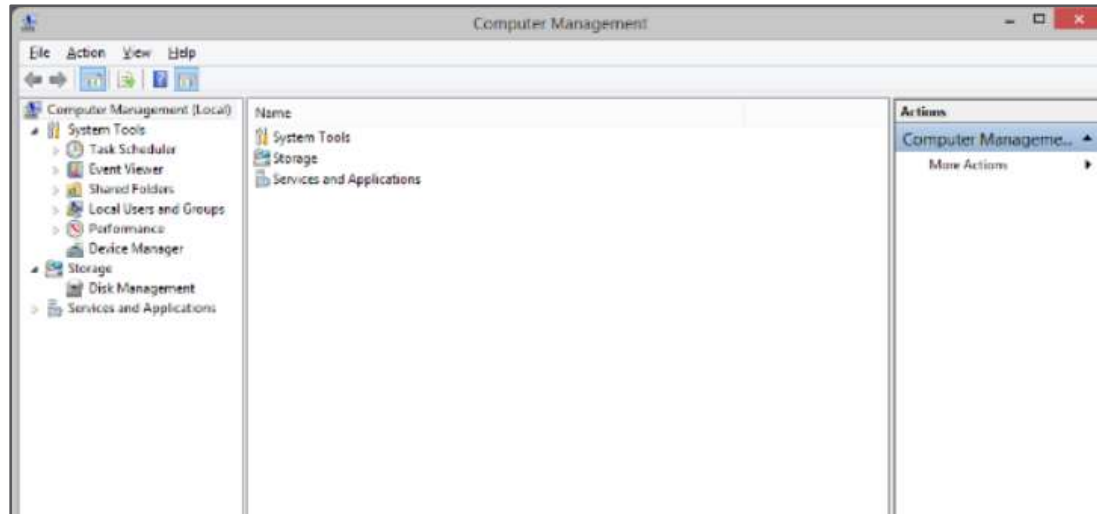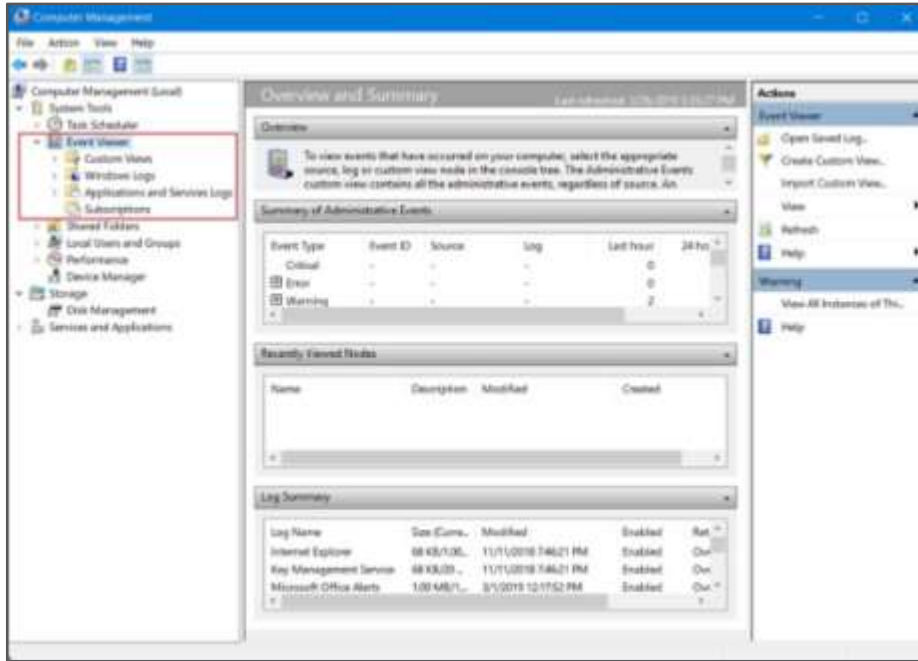
Event Viewer

- Event Viewer allows viewing the history of application, security, and Windows system events.

- Windows logs many events by their type or level:

  - **Information** - A successful event. A driver or program has executed successfully.

  - **Warning** - Indication of a potential problem with a software component.

  - **Error** - A problem exists, but no immediate action is required.

  - **Critical** - Immediate attention is required. Usually related to system or software crashes or lockups.

  - **Success Audit** (security only) - A security event has been successful. For example, a successful logon.

  - **Failure Audit** (security only) - A security event that has not been successful like failed attempts by someone attempting to log on.

Local Users and Groups
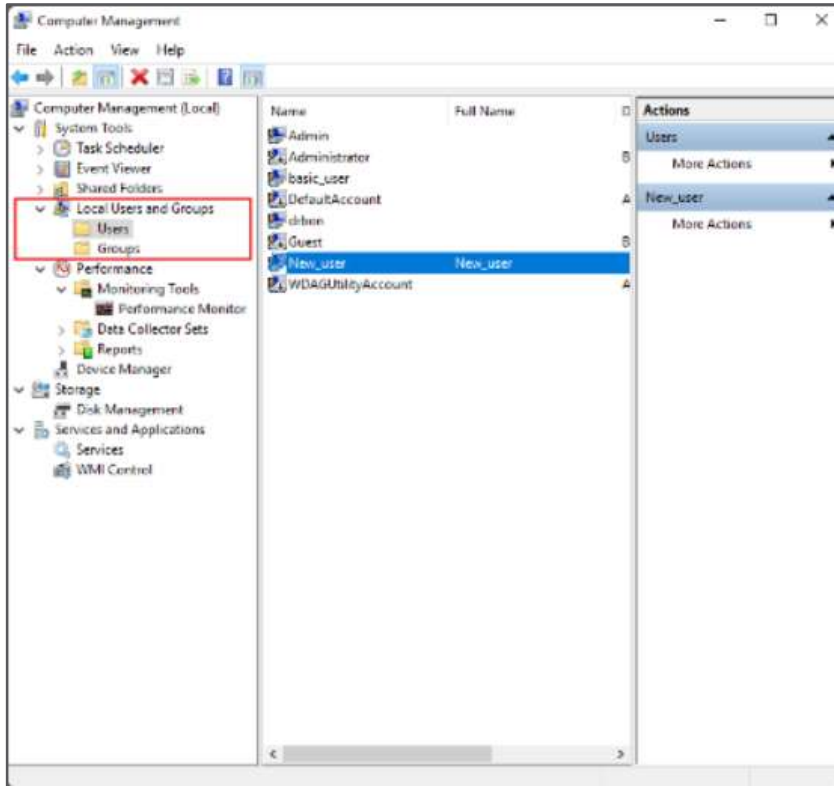
- Local Users and Groups provides an efficient way of managing users.

- You can create new users and assign those users to membership in Groups.

- Groups have rights and permissions assigned that are suitable for different types of users.

- Windows provides default user accounts and groups to make managing users easier:

  - **Administrators** - Full control of the computer and access to all folders.

  - **Guests** - Guests can access the computer through a temporary profile that is created at logon and deleted on logoff. Guest accounts are disabled by default.

  - **Users** - Users can perform common tasks such as running applications and accessing local or network printers. A user profile is created and persists on the system.

Performance Monitor

- The Performance Monitor is different from the performance information that is available through Task Manager and Resource Monitor.

- The purpose of the Performance Monitor administrative tool is the creation of detailed custom reports from very specific counters.
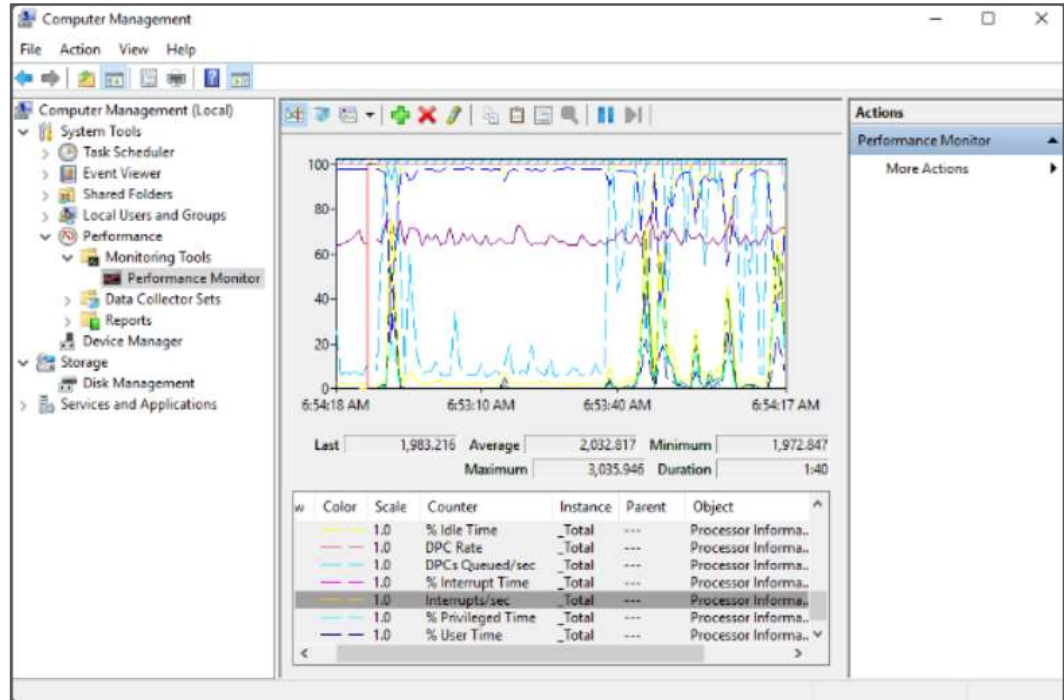
Component Services and Data Sources

- Component Services is an administrative tool used by administrators and developers to deploy, configure, and manage Component Object Model (COM) components.

- COM is a way to allow the use of software components in distributed environments such as in enterprise, internet, and intranet applications.
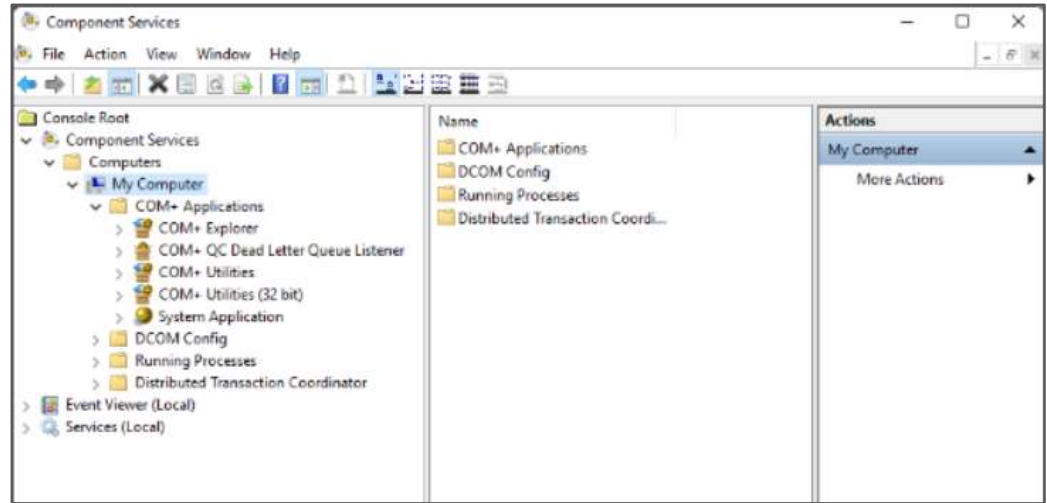
Services

- The Services console (SERVICES.MSC) allows you to manage all the services on your computer and remote computers.

- A service is a type of application that runs in the background to achieve a specific goal, or wait for service requests.

- To reduce security risks, only start the necessary services.
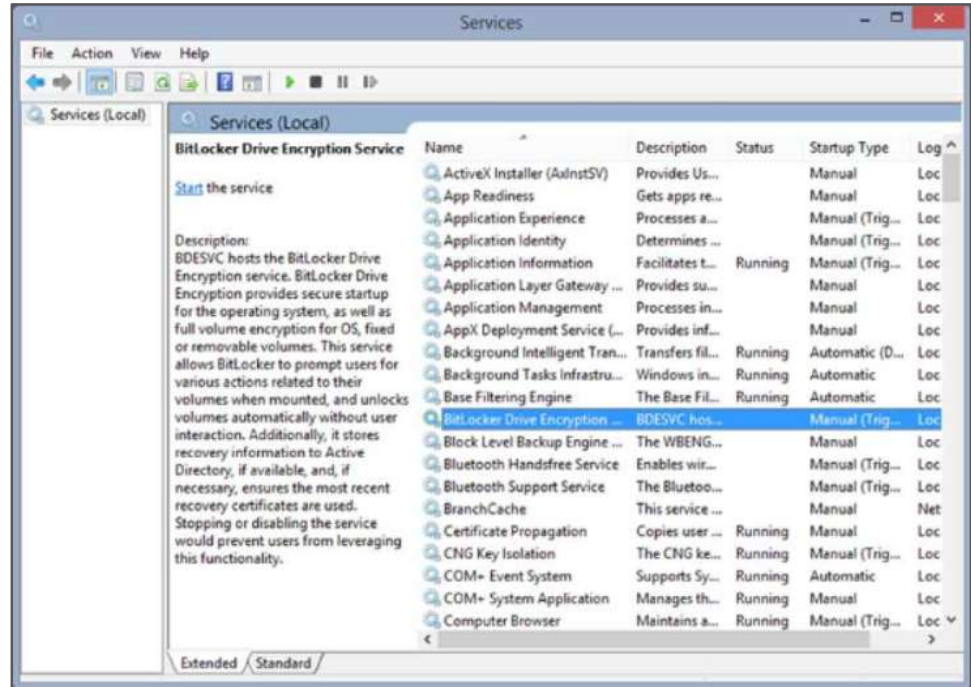
Data Sources

- Data Sources is a tool used by administrators to add, remove, or manage data sources using Open Database Connectivity (ODBC). ODBC is a technology that programs use to access a wide range of databases or data sources. The tool is shown in the figure.
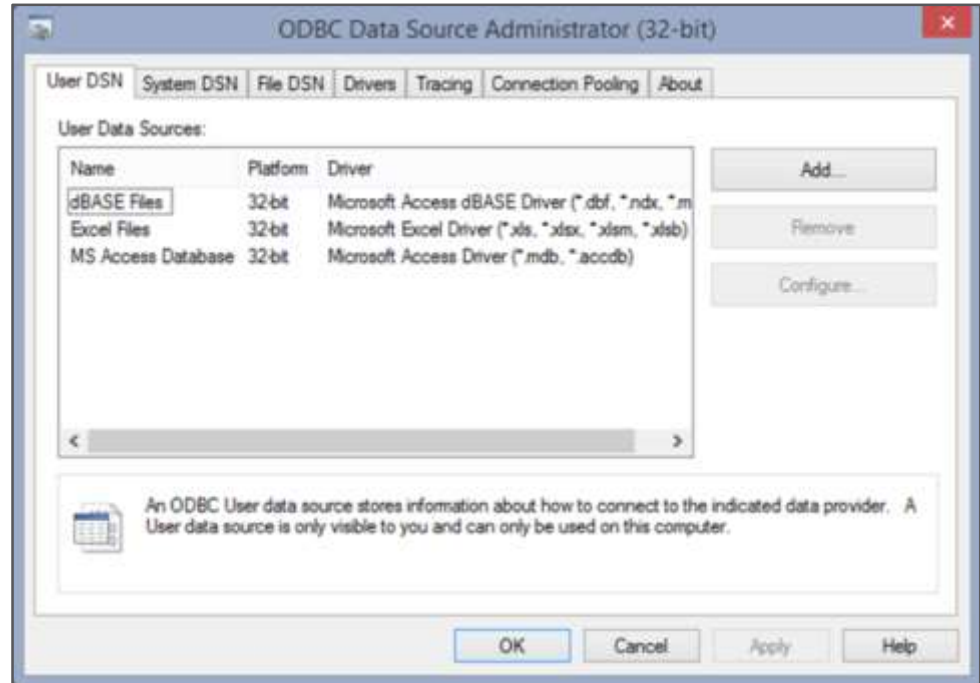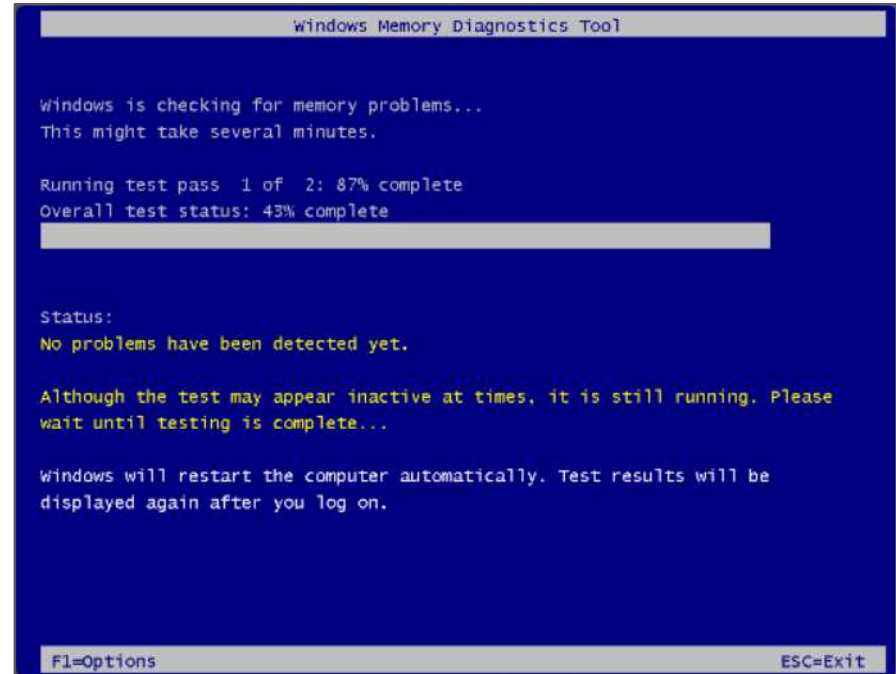
Print Management

- The Print Management utility provides a detailed view of all of the printers that are available to a computer.

- It is not available in all Windows editions. It is available in Windows servers, Pro, Enterprise, and Ultimate editions.

- It enables efficient configuration and monitoring of directly attached and network printers, including print queues for all printers to which it has access.

- It also allows the deployment of a printer configuration to multiple computers on a network through the use of group policies.
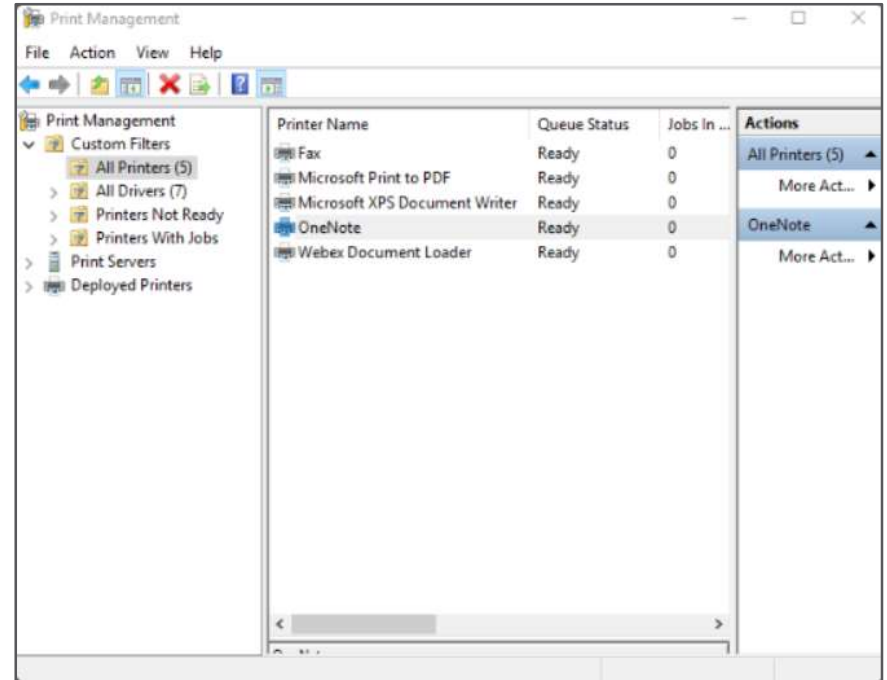
Windows Memory Diagnostics

- The Windows Memory Diagnostics tool schedules a memory test that will be executed when the computer starts.

- It can be configured to automatically restart the computer or execute the test the next time the computer starts.

- The type of diagnostics to be run can be configured by pressing F1 from the diagnostic as it runs, as shown in the figure.

- The results of the test can be viewed by finding the memory diagnostic test result in the Windows Log folder in Event Viewer.

Windows Memory Diagnostics Tool

Windows is checking for memory problems...
This might take several minutes.

Running test pass 1 of 2: 87% complete
Overall test status: 43% complete

Status:
No problems have been detected yet.

Although the test may appear inactive at times, it is still running. Please wait until testing is complete...

Windows will restart the computer automatically. Test results will be displayed again after you log on.

F1=Options   ESC=Exit

Lab – Monitor and Manage System Resources

In this lab, you will use administrative tools to monitor and manage system resources.

System Information
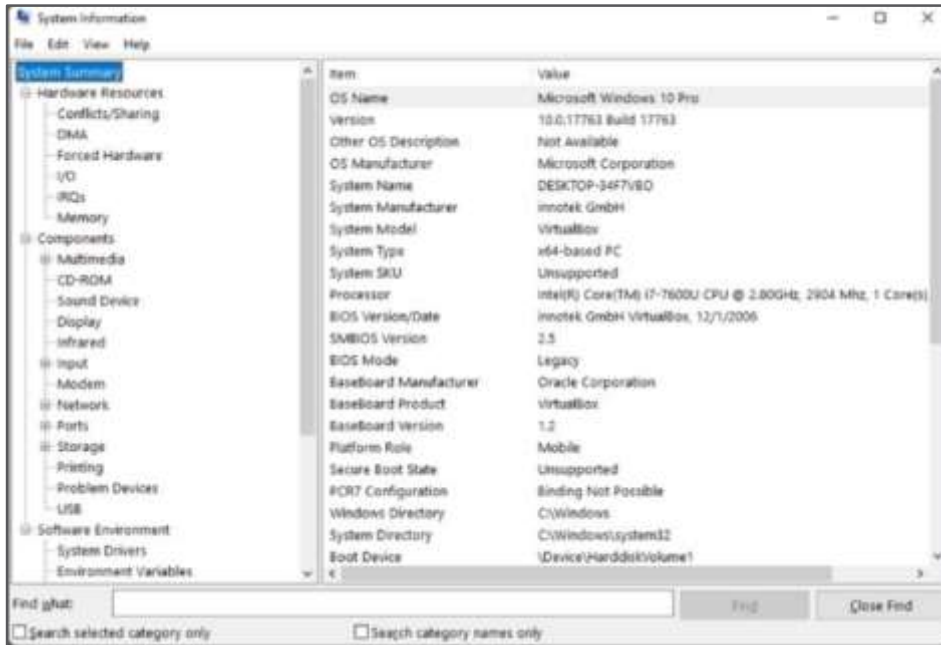
- Administrators can use the System Information tool to collect and display information about local and remote computers.

- The System Information tool is designed to quickly find information about software, drivers, hardware configurations, and computer components.

- You can also create a file containing all the information about the computer. To export a System Information file, select File > Export, type the filename, choose a location, and click Save.

- The System Information utility can also display the configuration of other machines on the network.

- It can be opened from the command prompt by typing **msinfo32**, or it can be found in the Administrative Tools Control Panel item.

System Configuration

- System Configuration (MSCONFIG) is a tool used to identify problems that keep Windows from starting correctly:

  - **General** – Displays Normal startup, Diagnostic startup, and Selective startup.

  - **Boot** – Choose the OS version to boot if more than one is present, or Safe boot.

  - **Services** – Lists services that are started with the OS. Allows individual services to not be loaded on boot for troubleshooting purposes.

  - **Startup** – In 7, it displays a list of all applications the automatically run when Windows starts. In 8.1 and 10, the user is referred to the same settings in Task Manager.

  - **Tools** – Displays a list of diagnostic tools for help with troubleshooting.

The Registry

- Every setting in Windows is stored in the Registry. When a user makes changes, the changes are stored in the Registry.

- The registry consists of a hierarchical arrangement of keys and subkeys represented as a tree. Levels of the subkey tree can be deeply nested with a maximum of 512 levels permitted.

- The registry exists as database files, called hives, associated with each of the top level registry keys.

- Each key has values. The values consist of the name of the value, its data type, and the setting or data that is associated with the value. The values tell Windows how to operate.

Root Key	Contents
HKKEY_LOCAL_MACHINE	• Information about the physical state of the computer including hardware configuration, network logon and security information, and Plug and Play information, etc.
HKEY_CURRENT_USER	• Data about the preferences of the currently logged on user, including Personalization settings, default devices, and programs, etc.
HKEY_CLASSES_ROOT	• Settings about the file system, file associations, and shortcuts. Information here is used when you ask Windows to run a file or view a directory.
HKEY_USERS	• All of the configuration settings for the hardware and software configured on the computer for all users.
HKEY_CURRENT_CONFIG	• Information about the current hardware profile of the machine.

Regedit

- The Registry Editor allows an administrator to view or make changes to the Windows Registry.

- Using the Registry Editor utility incorrectly could cause hardware, application, or OS problems, including having to reinstall the OS.

- The registry editor can only be opened from a search or command prompt.

- You can search for **regedit** and open it from the search results, or you can open a command or PowerShell prompt and type **regedit**.
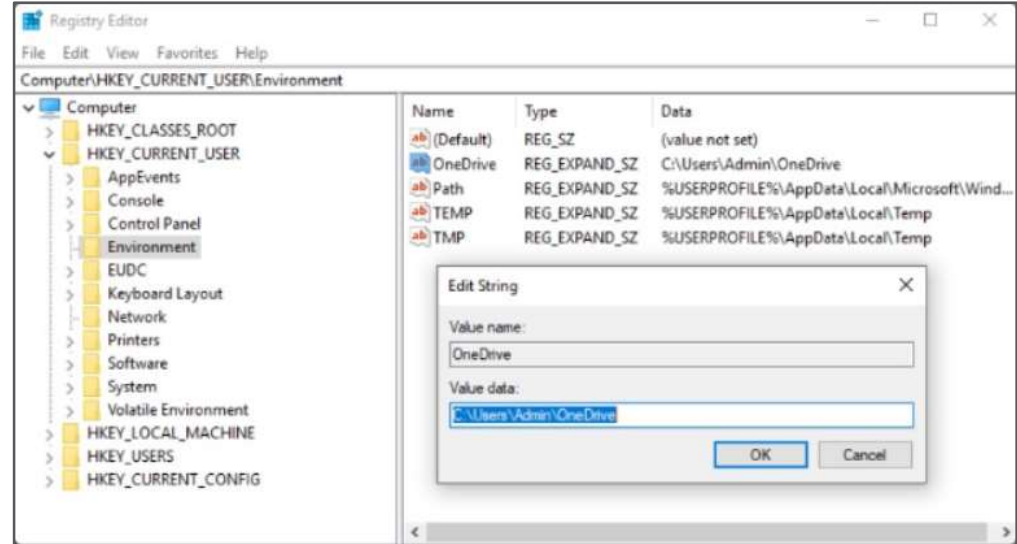
- The figure shows the **regedit** utility with the value of the OneDrive subkey open for modification.

Microsoft Management Console

- Microsoft Management Console (MMC) is an application that allows the creation of custom management consoles for collections of utilities and tools from Microsoft or other sources.

- When initially opened, the console is empty. Utilities and tools, known as snap-ins, can be added to the console. You can also add web page links, tasks, ActiveX controls, and folders.

- The console can then be saved and reopened when needed. This allows the construction of management consoles for specific purposes.

- The figure shows a new empty console with the dialog box for selecting and adding snap-ins.
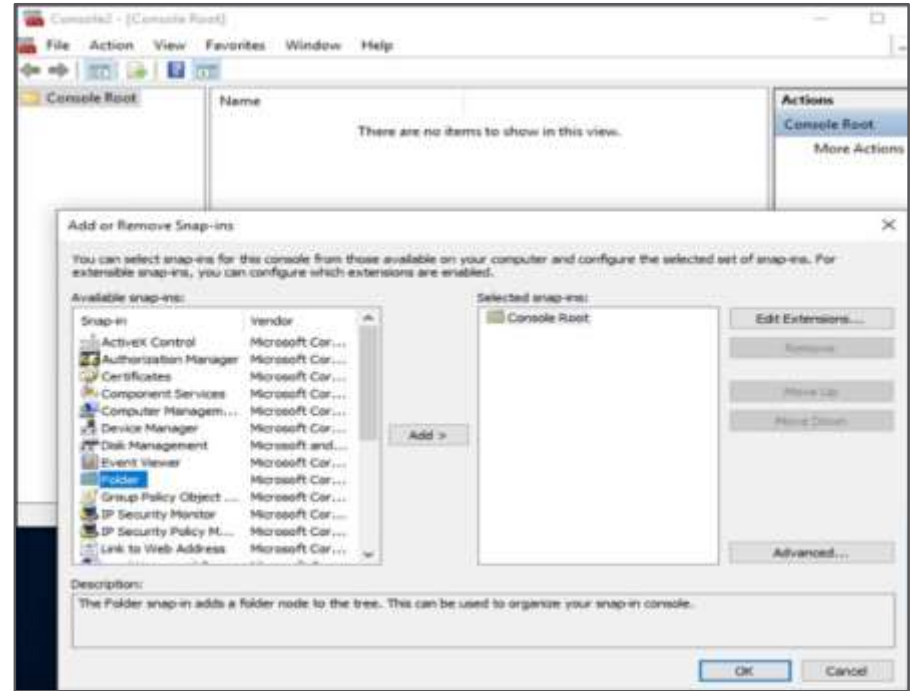
DxDiag

- DxDiag stands for DirectX Diagnostic Tool.

- It displays details for all DirectX components and drivers that are installed in a computer, as shown in the figure.

- DxDiag is run from a search or from the command line.

- DirectX is a software environment and interface for multimedia applications, especially games. It defines interfaces for 2D and 3D graphics, audio, media encoders and decoders, etc.
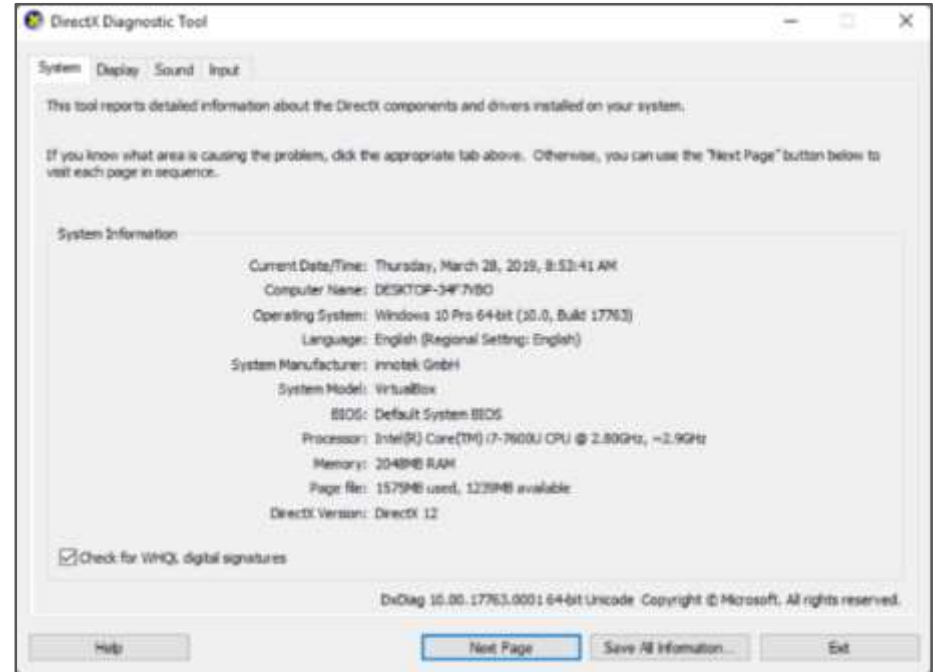
Lab – System Utilities
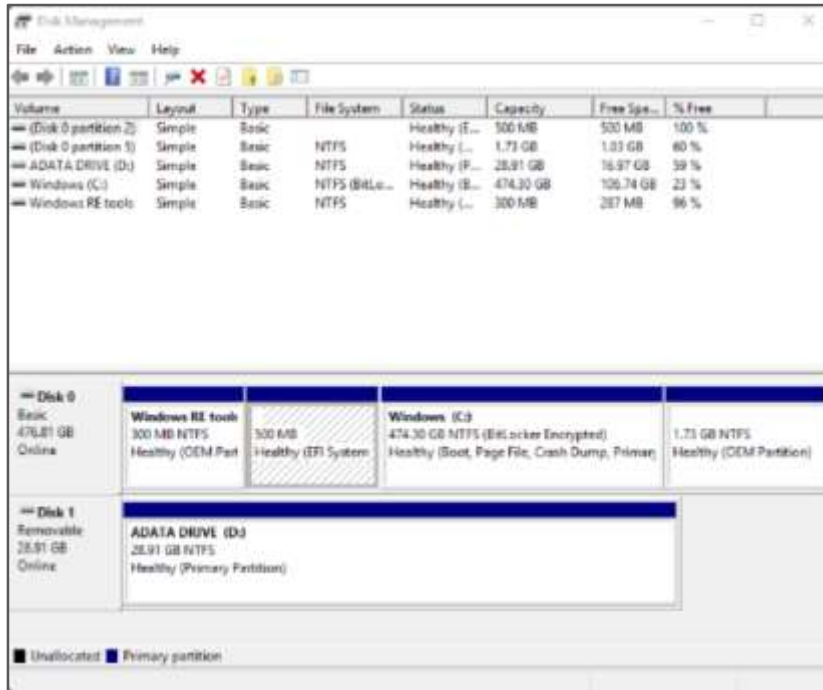
In this lab, you will use Windows utilities to configure operating system settings.

Lab – Manage System Files

In this lab, you will use Windows utilities to gather information about the computer.

Disk Management Utility

- The Disk Management utility can be opened by right-clicking **This PC** or **Computer** and selecting **Manage**. It can also be opened through the Computer Management Control Panel or in its own Window by using the **Win+X** menu and selecting **Disk Management**.

- In addition to extending and shrinking partitions, you can also use the Disk Management utility to complete the following tasks:

  - View drive status

  - Assign or change drive letters

  - Add drives

  - Add arrays

  - Designate the active partition

Drive Status

- Disk Management utility displays the status of each disk. The drives display one of the following conditions:

- **Foreign** - A dynamic disk that has been moved from another computer running Windows

- **Healthy** - A volume that is functioning properly

- **Initializing** - A basic disk that is being converted into a dynamic disk

- **Missing** - A dynamic disk that is corrupted, turned off, or disconnected

- **Not Initialized** - A disk that does not contain a valid signature

- **Online** - A basic or dynamic disk that is accessible and shows no problems

- **Online (Errors)** - I/O errors detected on a dynamic disk

- **Offline** - A dynamic disk that is corrupted or unavailable

- **Unreadable** - A basic or dynamic disk that has experienced hardware failure, corruption, or I/O errors
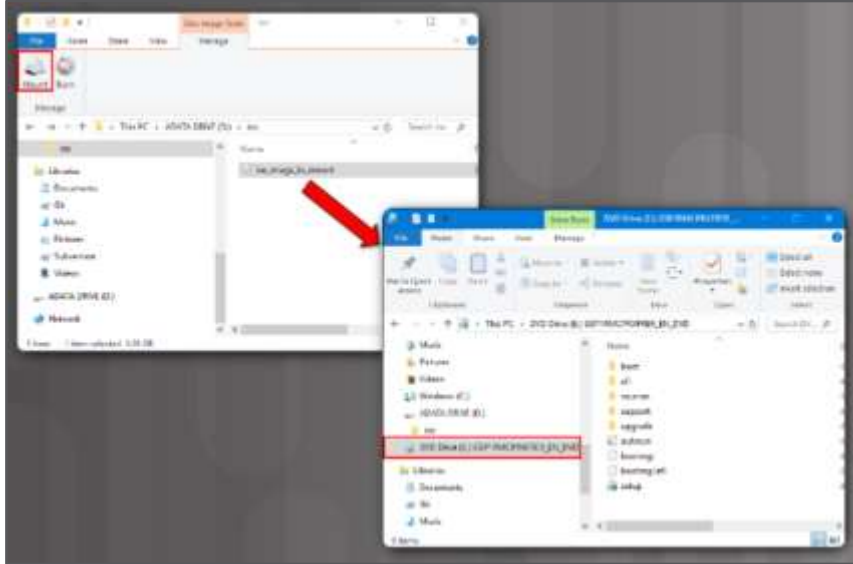
Mounting a Drive

- Mounting a drive refers to making a disk image file readable as a drive.

- ISO files can have their contents written to disk but they can also be mounted on virtual drives.

- To mount an image, open File Explorer, select an ISO file, in the ribbon select the Manage menu under Disk Image Tools and select Mount.

- The ISO file will be mounted as a removable media drive.

- The drive is an ISO image mounted as a volume.

- You can also create a mount point which is similar to a shortcut.

- You can create a mount point that makes an entire drive appear as a folder.

Disk Management
Adding Arrays

- In Windows disk management, you can create mirrored, spanned, or RAID 5 arrays from multiple dynamic disks.

- This is done by right-clicking a volume and selecting the type of multidisc volume that you want to create.

- There must be two or more initialized dynamic drives available on the computer.

- Storage Spaces is available in Windows 8 and 10.

- Storage Spaces is the disk array technology recommended by Windows. It creates pools of physical hard drives from which virtual disks (storage spaces) can be created.

- Like other disk arrays, Storage Spaces offer mirrored, striped, and parity options.
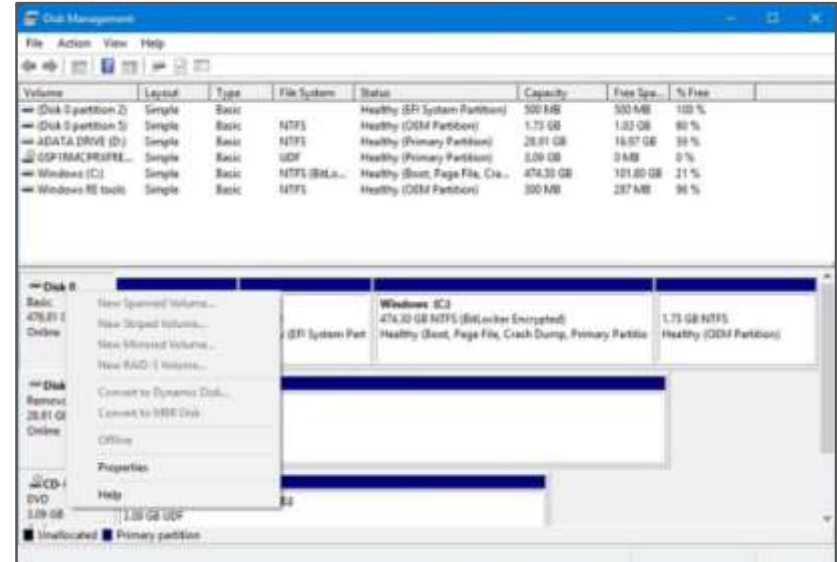
Disk Optimization
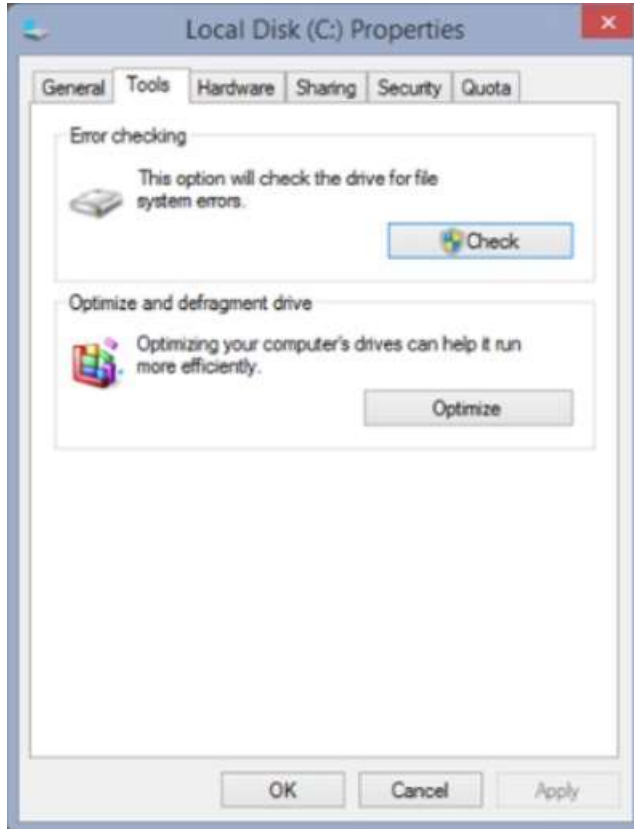
- To maintain and optimize disk storage, use various tools within Windows.

- A disk defragmenter gathers the noncontiguous data into one place, making the OS run faster.

- Do not perform disk defragmentation on SSDs.

- SSDs are optimized by their own controller and firmware.

- It should not be harmful to defragment Hybrid SSDs because they use hard disks to store data.

- In Windows 8 and 10, the option is called Optimize. In Windows 7, it is called Defragment Now accessed from the disk properties menu or from the File Explorer ribbon in Windows 8 and 10.

- The Optimize Drives utility allows analysis of the drive prior to optimization.

- You can also optimize the available space by doing a disk Cleanup operation.

Disk Error-Checking

Checking Disk BLACK DRIVE (I:)

Your device or disk was successfully scanned

No problems were found on the device or disk. It is ready to use.

If you removed the device or disk before all files were fully written to it, parts of some files might still be missing. If so, go back to the source and recopy those files to your device or disk.

⌃ Hide details   Close

Volume BLACK DRIVE created 2/7/2019 6:08 AM
Volume Serial Number is 7613-6F33
Windows is verifying files and folders...
File and folder verification is complete.
Windows has checked the file system and found no problems.
  63,897,536 KB total disk space.
    5,920 KB in 35 hidden files.
    8,928 KB in 279 folders.
  13,155,552 KB in 3,687 files.
  50,727,104 KB are available.

    32,768 bytes in each allocation unit.
  1,996,798 total allocation units on disk.
  1,585,222 allocation units available on disk.

- The Disk Error-Checking tool checks the integrity of files and folders by scanning the hard disk surface for physical errors.

- The tool fixes file system errors and checks the disk for bad sectors. It also attempts to recover data from bad sectors.

- In File Explorer or File Manager, right-click the drive and select **Properties**. Select the **Tools** tab and select **Check** or **Check Now** in Windows 7.

- In Windows 8, select **Scan Drive** to attempt to recover bad sectors. In Windows 7, select **Scan for and attempt recovery of bad sectors** and click **Start.**

- In Windows 8 and 10, click Check Results after scanning. This will open an Event Viewer window that will allow you to view the log entry for the scan.

Lab – Hard Drive Maintenance

In this lab, you will perform hard drive maintenance tasks including defragmentation and error checking.

System Requirements

	Minimum	Recommended
Operating System	Windows 7, 8, or 10 Mac OSX 10.5 and higher.	Windows 8 or 10. Mac OSX 10.7 or higher.
Processor	1 GHz or above	Multicore 2GHz
Memory	2GB	4GB
Display resolution	1024x768	1024x768
Available HDD space	2GB	8GB
Network connection	High-speed internet connection 512 kbps.	High-speed internet connection 1.5 Mbps.
Java	Most recent version	Most recent version
Other	Adobe Flash for video playback	

- Before purchasing or attempting to install an application, you should verify that the system requirements are met. Requirements are normally defined in the software packaging or on the software download page:

  - **Processor speed** - 32 or 64-bit, x86 or other

  - **RAM** - sometimes as minimum or recommended capacities

  - **Operating System** - and version

  - **Hard disk space** - available

  - **Software dependencies** - runtime and other frameworks or environments may be required to be present in order for the software to run

  - **Graphics and display**

  - **Network access** - if any

  - Peripheral devices

Installation Methods

- Most applications use an automatic installation process when the application disc is inserted in the optical drive.

- The user is required to click through the installation wizard and provide information when requested.

- Most Windows software installations are attended, meaning the user must be present to interact with the installer software to provide input about the options to use when installing the software.

- The various types of installations are defined in the figure.

Method	Definition
Attended	A user must be present to respond to prompts from the installer software.
Silent or unattended	No prompts or other information is displayed during installation.
Scheduled or automated	Installation that occurs without being started by a user. Preconfigured tasks that run according to conditions or timers can install software when appropriate.
Clean	All components of any previous version of the software have been removed prior to installation.
Network	The installation packages are available on a server and the installation occurs across the network.

Installing an Application
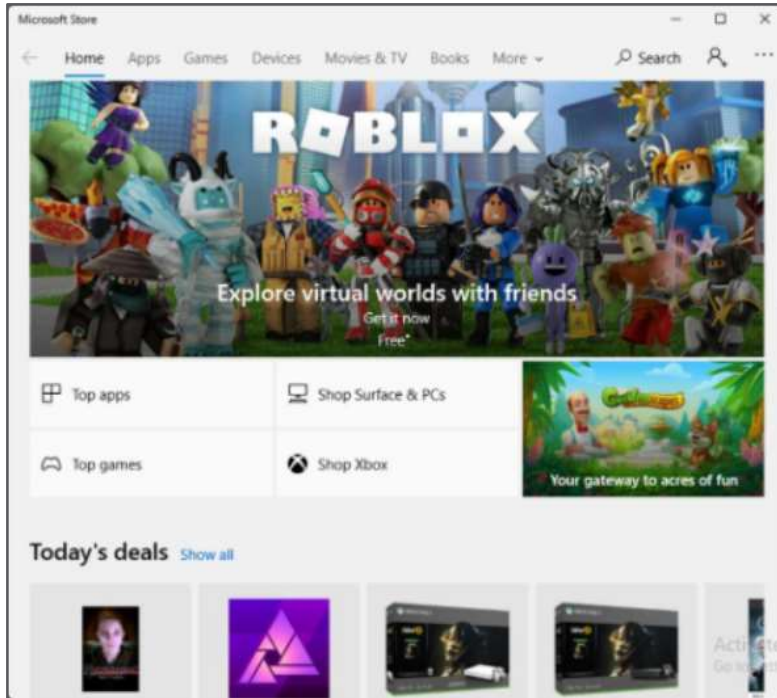
- Local installation can occur from the hard drive, CD, DVD, or USB media.

- To perform a local, attended installation, insert the media or drive, or open the downloaded program file.

- If the software installation does not start automatically you will need to browse the installation media in order to find and execute the installer.

- Installer software usually has an EXE or MSI (Microsoft Silent Installer) file extension.

- If there are problems, repair or uninstall the application.

- In addition to the process described above, Windows 8 and 10 provide access to the Microsoft Store, as shown in the figure.

Compatibility Mode

- Older applications may not run properly on newer Windows operating systems.

- If older software is not running properly, locate the executable file for the application. This can be done by right-clicking a shortcut for the application and selecting **Open file location.**

- Right-click the executable file and choose Properties.

- From the **Compatibility** tab, shown in the figure, you can run the **Windows compatibility troubleshooter** or manually configure the Compatibility Mode environment for the application.
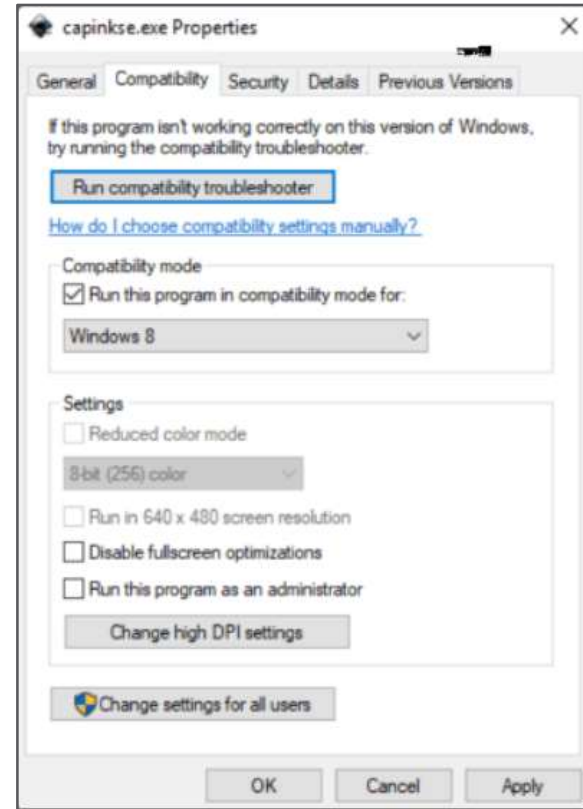
Uninstalling or Changing a Program
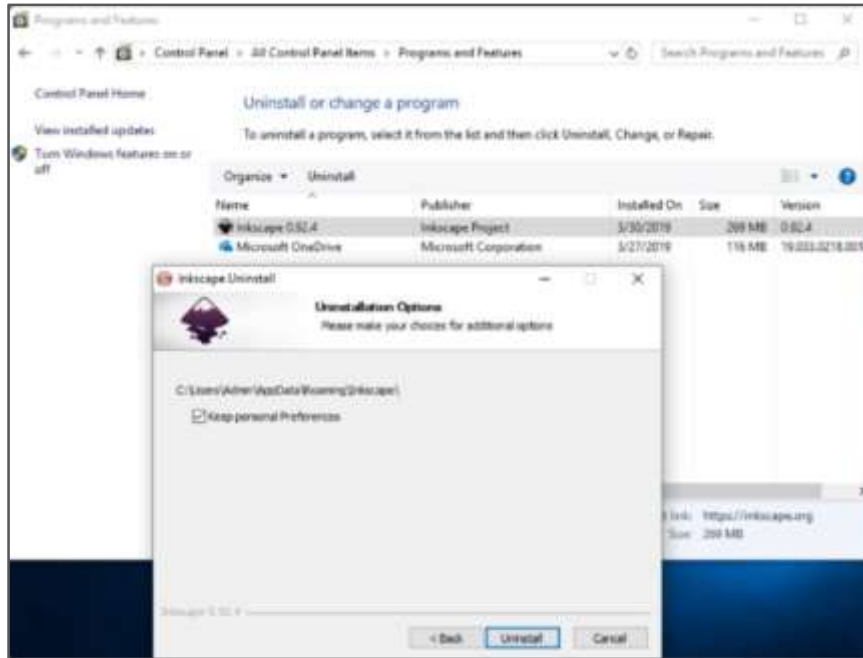
- If an application is uninstalled incorrectly, you might be leaving files on the hard drive and unnecessary settings in the registry, which wastes hard drive space and system resources.

- Unnecessary files might also reduce the speed at which the registry is read. Microsoft recommends that you always use the Programs and Features Control Panel utility when removing, changing, or repairing applications.

- The utility guides you through the software removal process and removes every file that was installed, as shown in the figure.

- Some applications may include an uninstall feature that is located in the Windows Start menu with the application.

Lab – Install Third-Party Software

In this lab, you will install and remove a third-party software application supplied by your instructor. You will install the Packet Tracer Windows application.

Note: You can skip this lab if you already did it previously in this curriculum and Packet Tracer is currently installed on the PC.

Note: You should skip Part 2 if you are using Packet Tracer later in this curriculum.

Security Considerations

- Allowing users to install software on computers that are owned by a business organization can be a security risk.

- Users can be tricked into downloading malicious software that can cause data loss, either through theft or destruction.

- Malicious software, known as malware, can infect all computers that are attached to a network and can cause widespread damage and loss.

- As a technician, it is important to enforce policies regarding software installation and ensure that antimalware software, such as Windows Defender, is active and up to date.
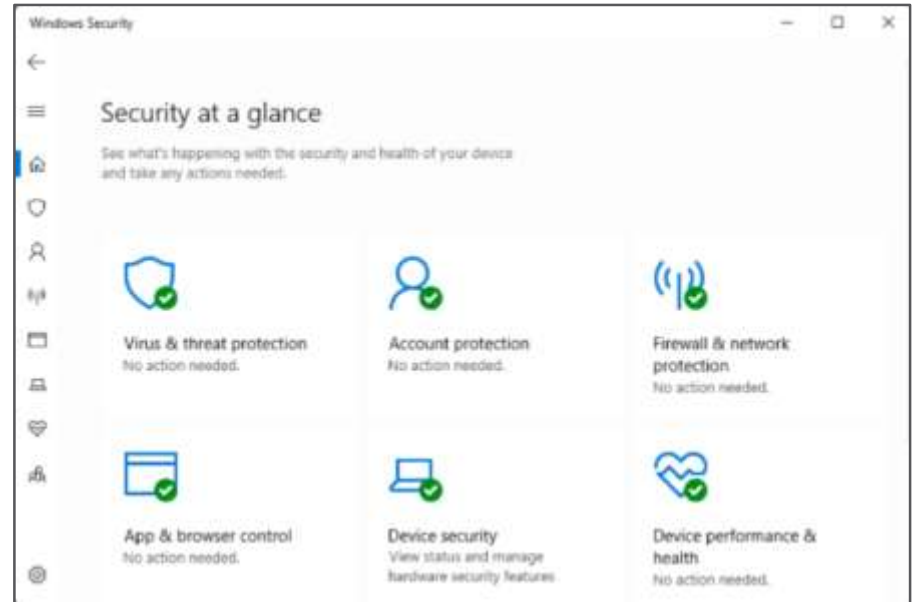
11.4 Command-Line Tools
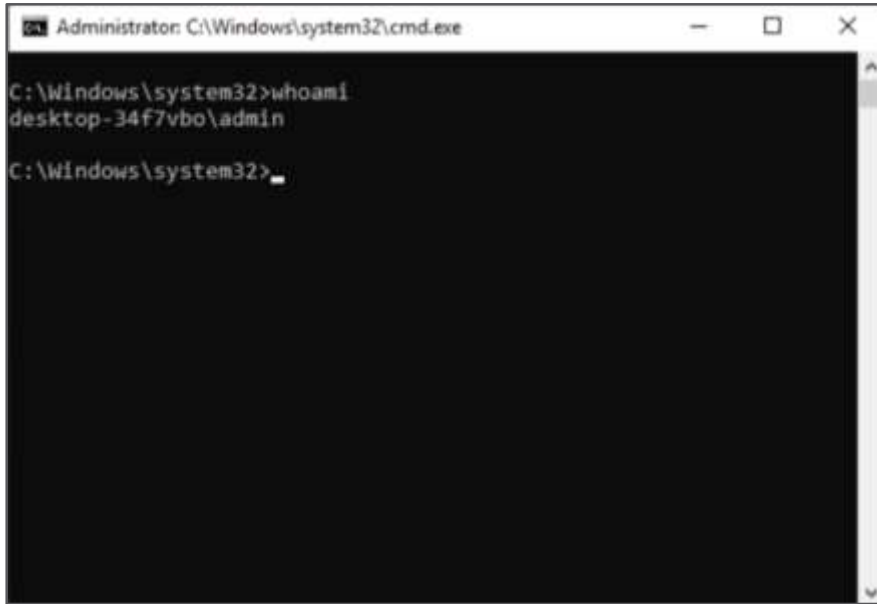
Using Windows CLI
PowerShell
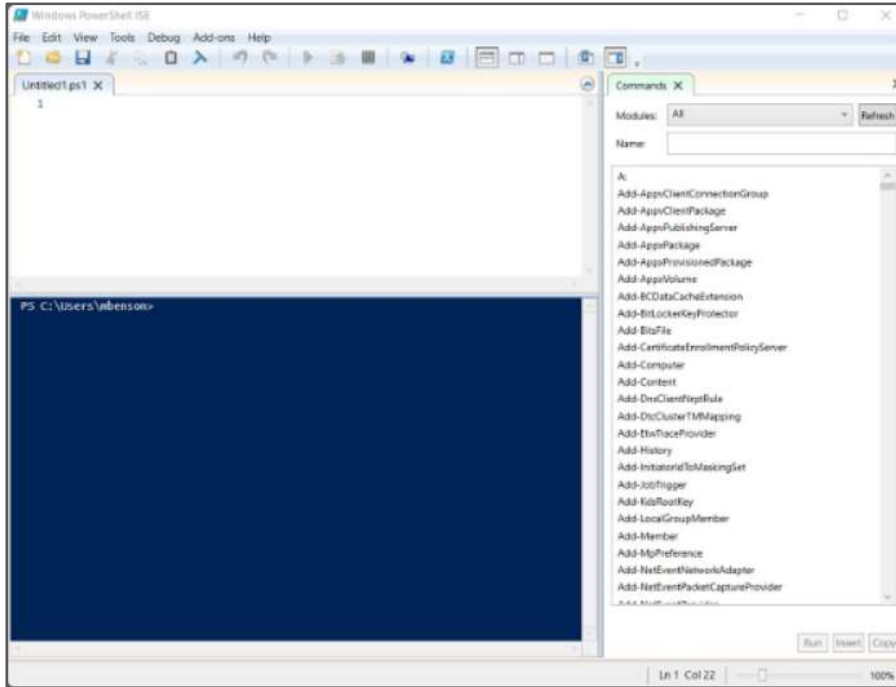
- The old Windows command line application was replaced in the Windows Power User menu Win+X with PowerShell.

- The original command line still exists in Windows 10, and can be opened by typing cmd into the search field on the Taskbar. You can also change which command line is displayed in the menu by changing a Taskbar setting.

- PowerShell is a more powerful command line utility. It offers advanced features, such as scripting and automation. It comes with its own scripting development environment, called PowerShell ISE.

- PowerShell uses "cmdlets", or small applications, that represent the commands that are available. PowerShell also allows naming of cmdlets with aliases.

- The figure shows Windows ISE. PowerShell can also be opened as the command line shell alone.

The Command Shell
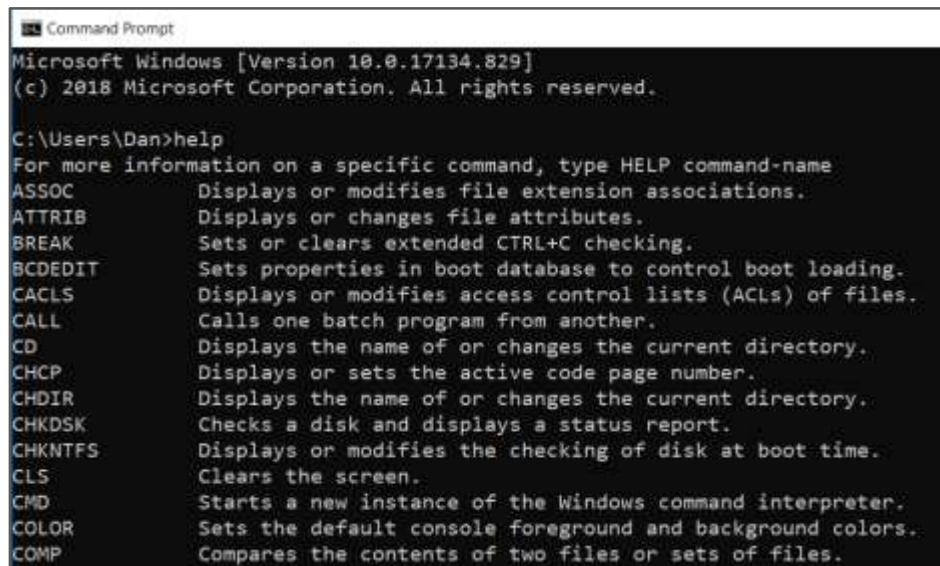
- Windows has two command line utilities. PowerShell and the classic command application, known as cmd.

- CMD has been the default command line for Windows until PowerShell with Windows 10 build 14791

- To open the command shell, type cmd in the search box and click the app in the results.

- Or, use the Win+R key to open a run box and type cmd in the run box and click OK.

- Press Ctrl+Shift+Enter to run the command prompt as an administrator.

- All commonly used commands are supported by Windows 7, 8, and 10.

Basic Commands

- **help** – get information on commands

- **command /?** – get help on a specific command

- **cls** – clear the screen

- **Up-arrow keys** – move through previously entered commands

- **F7 key** – display command history in an overlay window

- **Ctrl+C key** – exit a running command process or script

- **exit** – close the command window


```
Command Prompt

Microsoft Windows [Version 10.0.17134.829]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\Users\Dan>help
For more information on a specific command, type HELP command-name
ASSOC          Displays or modifies file extension associations.
ATTRIB         Displays or changes file attributes.
BREAK          Sets or clears extended CTRL+C checking.
BCDEDIT        Sets properties in boot database to control boot loading.
CACLS          Displays or modifies access control lists (ACLs) of files.
CALL           Calls one batch program from another.
CD             Displays the name of or changes the current directory.
CHCP           Displays or sets the active code page number.
CHDIR          Displays the name of or changes the current directory.
CHKDSK         Checks a disk and displays a status report.
CHKNTFS        Displays or modifies the checking of disk at boot time.
CLS            Clears the screen.
CMD            Starts a new instance of the Windows command interpreter.
COLOR          Sets the default console foreground and background colors.
COMP           Compares the contents of two files or sets of files.
```

Video Demonstration – Managing Command Line Sessions

Lab – Work in the Windows Command Shell

In this lab, you will practice techniques for working in the Windows Command Shell.

Command Syntax Conventions

- Many conventions used by Microsoft for CLI commands are summarized in the figure.

- Special characters, called wildcards, can be substituted for characters or groups of characters in filenames.

- Wildcards can be used when you only know part of a filename that you are trying to find or when you want to perform a file operation on a group of files that share elements of a filename or extension.

- The two wildcards that can be used at the Windows command line are:

  - **The asterisk (*)** - This character matches groups of characters, including entire filenames and file extensions.

  - **The question mark (?)** - This character stands for any single character. It does not stand for a group of characters.

Notation	Description
Text without brackets or braces	Must be typed exactly as shown.
<Text inside angle brackets>	A value that must be supplied.
[Text inside square brackets]	Optional input.
{Text inside braces}	Must choose one of the list of items.
Vertical bar (|)	Mutually exclusive items.
Ellipsis (...)	Repeatable input.

File System Navigation

- When working at the command line, there is no File Explorer to help you get to the files and folders that you want to work with. Instead, you need to move through the folder structure using a combination of commands, normally displaying the contents of a drive or directory and changing directories until you find what you are looking for.

File System Navigation - Commands

- **<drive>:** – display contents from a different drive like: d:

- **dir** – display the contents of the current directory

- **cd** – change directory

```
C:\myFolders>dir
 Volume in drive C is Windows
 Volume Serial Number is 9C9E-C3F4

 Directory of C:\myFolders

04/04/2019  05:10 PM    <DIR>          .
04/04/2019  05:10 PM    <DIR>          ..
04/04/2019  05:10 PM                 6 newfile1.txt
04/04/2019  05:10 PM    <DIR>          newFolder_1
04/04/2019  04:37 PM    <DIR>          newFolder_2
               1 File(s)              6 bytes
               4 Dir(s)  133,548,445,696 bytes free

C:\myFolders>
```

```
C:\myFolders>d:
D:\>dir
 Volume in drive D is ADATA DRIVE
 Volume Serial Number is CCD9-AB77

Directory of D:\
03/28/2019  06:37 PM    <DIR>          iso
02/06/2019  04:52 PM    5,075,539,968 Win10_1809Oct_English_x64.iso
02/15/2019  02:23 PM    3,320,903,680 Win7_Pro_SP1_English_x64.iso
02/07/2019  10:57 AM    4,320,641,024 Win8.1_English_x64_no_reg.iso
               3 File(s) 12,717,084,672 bytes
               1 Dir(s)  14,903,140,352 bytes free

D:\>
```

```
C:\Users>dir
 Volume in drive C has no label.
 Volume Serial Number is 5A1B-98AA

 Directory of C:\Users

03/14/2019  01:53 PM    <DIR>          .
03/14/2019  01:53 PM    <DIR>          ..
04/04/2019  06:12 PM    <DIR>          Admin
04/04/2019  03:34 PM    <DIR>          basic_user
04/02/2019  03:18 PM    <DIR>          drbon
03/06/2019  11:08 AM    <DIR>          Public
               0 File(s)              0 bytes
               6 Dir(s)  36,035,579,904 bytes free

C:\Users>cd Admin

C:\Users\Admin>dir
 Volume in drive C has no label.
```

Video Demonstration – Working with Files and Folders

Video Demonstration: Working with Files and Folders

In this video demonstration, you will learn about working with files and folders. You will learn to use the following commands:

- Date
- Whoami
- Control + C
- CLS
- DIR
- Pipe (|) more
- Move
- CD with .. And \
- MD
- Echo
- Redirector (>)
- Copy
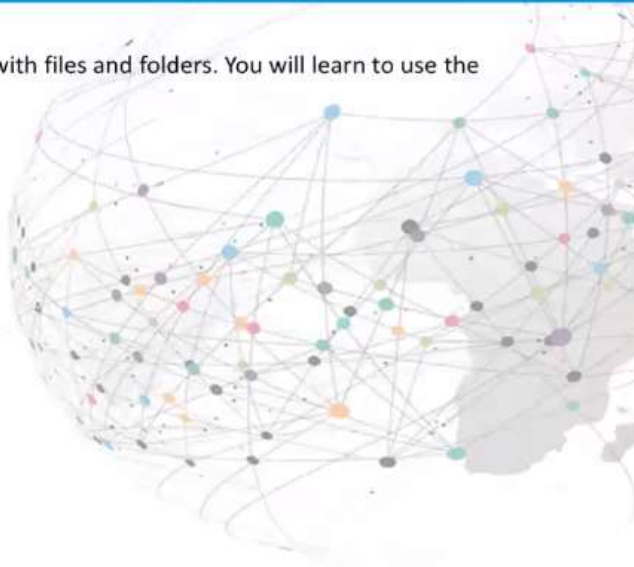
Manipulating Folders - Commands

- **md** – make directory. Create a new directory

- **rd** – remove directory. Delete a directory

- **move** – move a file or directory from one directory to another

- **ren** – rename a directory or file

```
C:\myFolders>md New_Folder

C:\myFolders>dir
 Volume in drive C is Windows
 Volume Serial Number is 9C9E-C3F4

 Directory of C:\myFolders

04/04/2019  04:21 PM    <DIR>          .
04/04/2019  04:21 PM    <DIR>          ..
04/04/2019  04:21 PM    <DIR>          New_Folder
               0 File(s)              0 bytes
               3 Dir(s)  133,642,625,024 bytes free

C:\myFolders>
```

Manipulating Files - Commands

- **>** – redirect. Send the output of a command to a file

  example: dir > directory.txt

- **type** – display the contents of a file

- **more** – display the contents of a file one screen at a time

- **del** – delete a file or folder

- **copy** – make a copy of a file

- **xcopy** – extended copy. Copy files or entire directory trees

- **robocopy** – robust copy. Copy files and entire directory trees

- **move** – move a file from a source location to a destination location

```
C:\Users\Admin\Documents>dir > directory.txt

C:\Users\Admin\Documents>dir
 Volume in drive C has no label.
 Volume Serial Number is 5A1B-9BAA

 Directory of C:\Users\Admin\Documents

04/05/2019  10:23 AM    <DIR>          .
04/05/2019  10:23 AM    <DIR>          ..
04/05/2019  10:23 AM               761 directory.txt
03/27/2019  08:34 AM    <DIR>          Fax
04/02/2019  07:50 AM             5,740 help.txt
03/14/2019  12:24 PM    <DIR>          Level 1
03/29/2019  07:05 AM    <DIR>          mounted docs
04/02/2019  06:56 AM                22 myfile.txt
03/27/2019  08:34 AM    <DIR>          Scanned Documents
04/03/2019  09:31 AM    <DIR>          Sound recordings
03/27/2019  02:20 PM         1,351,034 test.nfo
               4 File(s)      1,357,557 bytes
               7 Dir(s)  35,931,115,520 bytes free

C:\Users\Admin\Documents>_
```

Lab - File System Commands

In this lab, you will use CLI commands to manage files and folders in Windows.

Disk Operations - Commands

- **chkdsk** – check disk. Checks a file system for errors, including errors with physical media

- **format** – creates a new file system for a disk. May also check for physical disk errors

- **diskpart** – starts a separate command interpreter with commands for working with disk partitions

```
C:\Users\Admin\Documents>chkdsk e:
The type of the file system is NTFS.
Volume label is New Volume.

WARNING!  /F parameter not specified.
Running CHKDSK in read-only mode.

Stage 1: Examining basic file system structure ...
  256 file records processed.
File verification completed.
  0 large file records processed.
  0 bad file records processed.

Stage 2: Examining file name linkage ...
  278 index entries processed.
Index verification completed.
  0 unindexed files scanned.
  0 unindexed files recovered to lost and found.
  0 reparse records processed.
  0 reparse records processed.

Stage 3: Examining security descriptors ...
Security descriptor verification completed.
  11 data files processed.

Windows has scanned the file system and found no problems.
No further action is required
```

Lab - Disk CLI Commands

In this lab, you will work with disk CLI commands.

System CLI Commands

- **tasklist** - displays a list of the processes that are currently running on the local or remote computer

- **taskkill** - allows a running process to be killed

- **dism** - Deployment Image Servicing and Management. Used to work with system images before they are deployed

- **sfc** - verifies and repairs Windows system files

- **shutdown** - power off a local or remote computer

```
C:\Windows\system32>tasklist |more

Image Name                     PID Session Name        Session#    Mem Usage
========================= ======== ================ =========== ============
System Idle Process              0 Services                   0          8 K
System                           4 Services                   0        116 K
Registry                        68 Services                   0     50,916 K
smss.exe                       328 Services                   0        920 K
csrss.exe                      416 Services                   0      4,056 K
wininit.exe                    484 Services                   0      5,344 K
csrss.exe                      492 Console                    1      4,392 K
winlogon.exe                   552 Console                    1      8,504 K
services.exe                   576 Services                   0      6,788 K
lsass.exe                      584 Services                   0     13,492 K
fontdrvhost.exe                680 Console                    1      6,044 K
fontdrvhost.exe                688 Services                   0      2,624 K
svchost.exe                    704 Services                   0     29,896 K
svchost.exe                    804 Services                   0     12,612 K
dwm.exe                        896 Console                    1     73,788 K
svchost.exe                    980 Services                   0     78,508 K
svchost.exe                    996 Services                   0     23,504 K
-- More  --
```

Lab - Task and System CLI Commands

In this lab, you will work with task and system CLI commands.

Other Useful Commands

- **gpupdate** - group policy update

  - /target:computer – force update of another computer

  - /force – force and update even if Group Policy has not changed

  - /boot – restart computer after update

- **gpresult** - display Group Policy Resultant Set of Policy (RSoP) information

  - /s – the system to view the result on, name or ip address

  - /r – displays summary data

- **net use** - display and connect to network resources

- **net user** - display and change information about computer users

```
C:\>gpupdate
Updating policy...

Computer Policy update has completed successfully.
User Policy update has completed successfully.


C:\>gpre
```

Running System Utilities
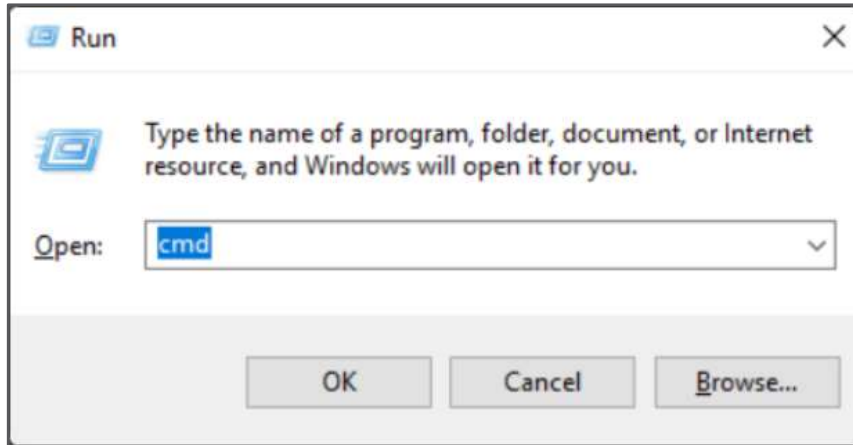
- The Windows run line utility can be opened by pressing the **Win+R** keys and entering **cmd** to open the command line window, as shown here. The following windows utilities and tools can also be run by entering the commands shown in the run line utility:

- **EXPLORER** - Opens File Explorer or Windows Explorer

- **MMC** - Opens Microsoft Management Console (MMC). Specify the path and .msc filename to open a saved console

- **MSINFO32** - Opens the System Information window, which shows a summary of system components, including hardware components and software information

- **MSTSC** - Opens the Remote Desktop utility

- **NOTEPAD** - Opens the Notepad basic text editor

Lab - Other Useful Commands

In this lab, you will work with other useful commands.

11.5 Windows Networking

Domain and Workgroup

- **Domain** - A domain is a group of computers and electronic devices with a common set of rules and procedures administered as a unit. Computers in a domain can be located in different locations in the world. A specialized server called a domain controller manages all security-related aspects of users and network resources, centralizing security and administration.

- **Workgroup** - A workgroup is a collection of workstations and servers on a LAN that are designed to communicate and exchange data with one another. Each individual workstation controls its user accounts, security information, and access to data and resources.
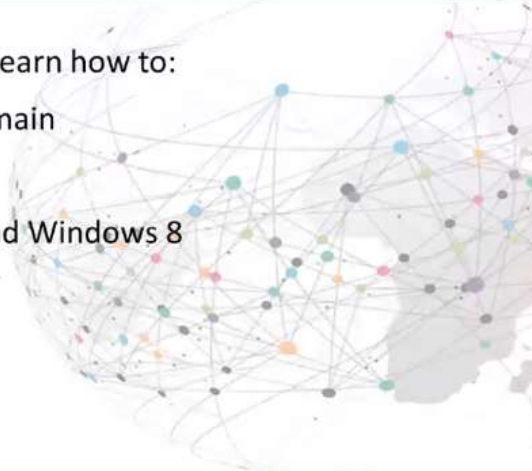
Homegroup

- Homegroup has been removed from Windows 10

- There can only be one homegroup per workgroup on a network and computers can only be a member of one homegroup at a time.

- Homegroups are secured with a simple password.

- One user in the workgroup creates the homegroup. The other users can join the homegroup, provided they know the homegroup password.

- Homegroup availability depends on your network location profile:

  - **Home Network** - allowed to create or join a homegroup

  - **Work Network** - not allowed to create or join a homegroup, but you can view and share resources with other computers

  - **Public Network** - homegroup not available

- When a computer joins a homegroup, all user accounts on the computer, except the Guest account, become members of the homegroup.

Video Demonstration - Connecting to a Workgroup or Domain

Video Demonstration: Connecting to a Workgroup or Domain

In this video demonstration, you will learn how to:

- Distinguish a Workgroup from a Domain
- Locate Workgroup in Windows 10
- Locate Homegroup in Windows 7 and Windows 8

Network Shares and Mapping Drives

- Network file sharing and mapping network drives is a secure and convenient way to provide easy access to network resources.

- Permissions define the type of access a user has to a file or folder:

  - **Read** - the user can view the file and subfolder names, navigate to subfolders, view data in files, and run program files.

  - **Change** - in address to Read permissions the user can add files and subfolders, change the data in files and delete subfolders and files.

  - **Full Control** - in addition to change and read permissions, the user can change the permission of files and folders in an NTFS partition and take ownership of files and folders.
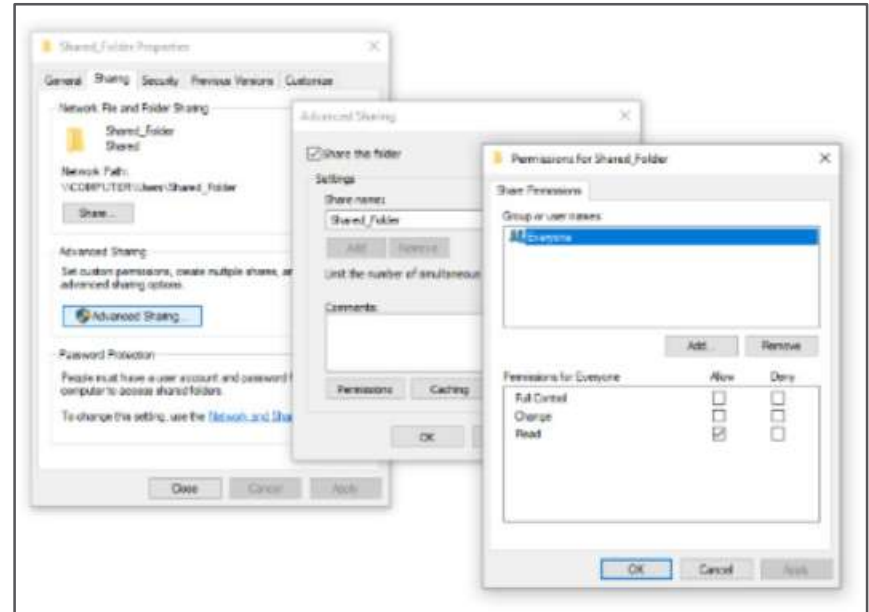
Administrative Shares

- Administrative shares, also called hidden shares, are identified with a dollar sign ($) at the end of the share name.

- By default, Windows creates several hidden administrative shares. These include the root folder of any local drives (C$), the system folder (ADMIN$), and the print driver folder (PRINT$).

- Administrative shares are hidden from users and only accessible by members of the local administrators' group.

- The figure shows administrative shares on a Windows 10 PC. Note the $ after each share name, making them hidden shares.

- Adding a $ sign to the end of any local share name will cause it to become a hidden share. It will not be visible by browsing but can be accessed via the command-line by mapping a drive to the share name.
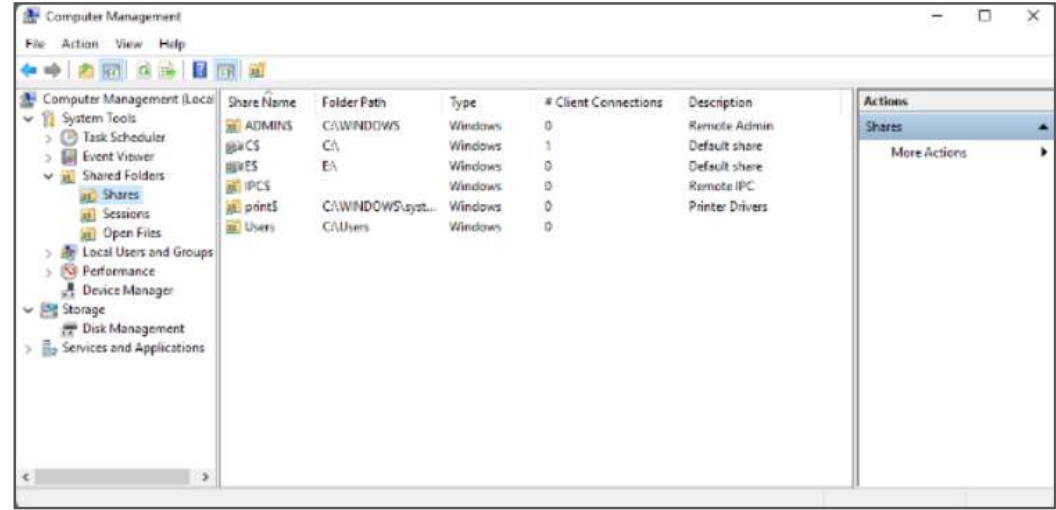
Sharing Local Resources

- Windows 10 controls which resources are shared and how they are shared by turning specific sharing features on and off.

- Advanced Sharing Settings, located in the Network and Sharing Center, manages the sharing options for three different network profiles; Private, Guest or Public, and All Networks.

- Different options can be chosen for each profile. The following items can be controlled:

  - Network discovery - File and printer sharing - Public folder sharing - Password protected sharing - Media Streaming

- To enable sharing resources between computers connected to the same workgroup, Network Discovery and File and printer sharing must be turned on, as shown here.

Printer Sharing vs. Network Printer Mapping

- A local printer can be shared on the network via the Sharing tab on the Printer Properties dialog box as shown here.

- Once a printer is shared, users with the correct permissions can connect to the shared printer over the network.

- Drivers for the printer can be installed on the local computer so that clients obtain the drivers when they connect to the print share.

- To find the shared printer on the network, users can browse through network resources.
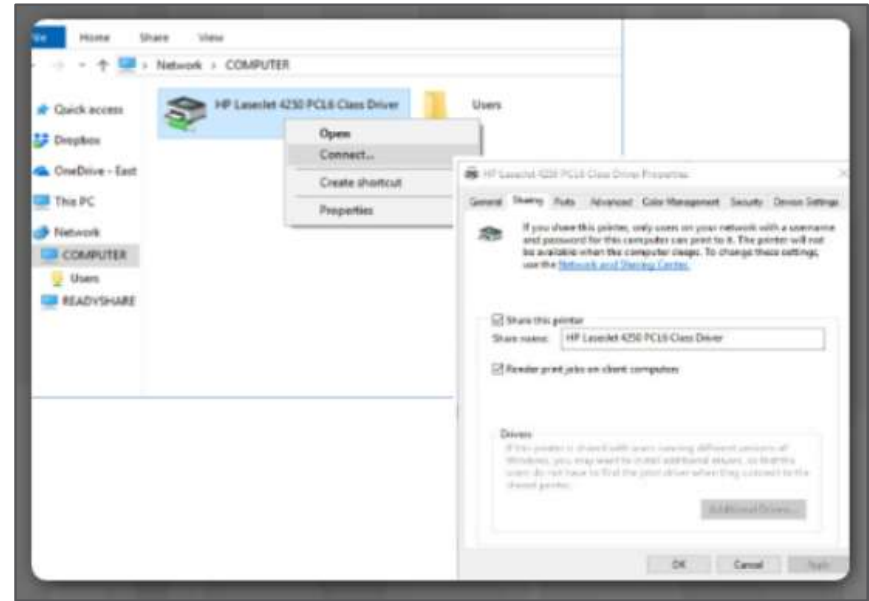
Printer Sharing

Video Demonstration – Sharing Files and Folders on a Local Network

Video Demonstration: Sharing Files and Folders on a Local Network

In this video demonstration, you will learn how to:

- Share a folder to Homegroup
- Share a folder to specific users or groups
- Set permission for full control, change or read

Lab - Share Resources

In this lab, you will work with another student. You will create and share a folder. You will also set permissions for the share so your partner will only have read access.

Configuring Wired Network Interfaces in Windows 10

- Windows 10 network settings are managed through the Network & Internet section in the Settings App.

- From the Network & Internet window, there are links to View network properties and to the Network and Sharing Center.

- Available network connections, both wired and wireless, can be viewed by selecting the Change Adapter Options link. From there, each network connection can be configured.

Configuring a Wired NIC

- After the NIC driver is installed the IP address settings must be configured. A computer can be assigned its IP configuration in one of two ways:

    - **Manually** - The host is statically assigned a specific IP configuration

    - **Dynamically** - The host requests its IP address configuration from a DHCP server

- From the properties window of the wired NIC, both IPv4 and IPv6 addresses and other options such as the default gateway and DNS server address can be configured
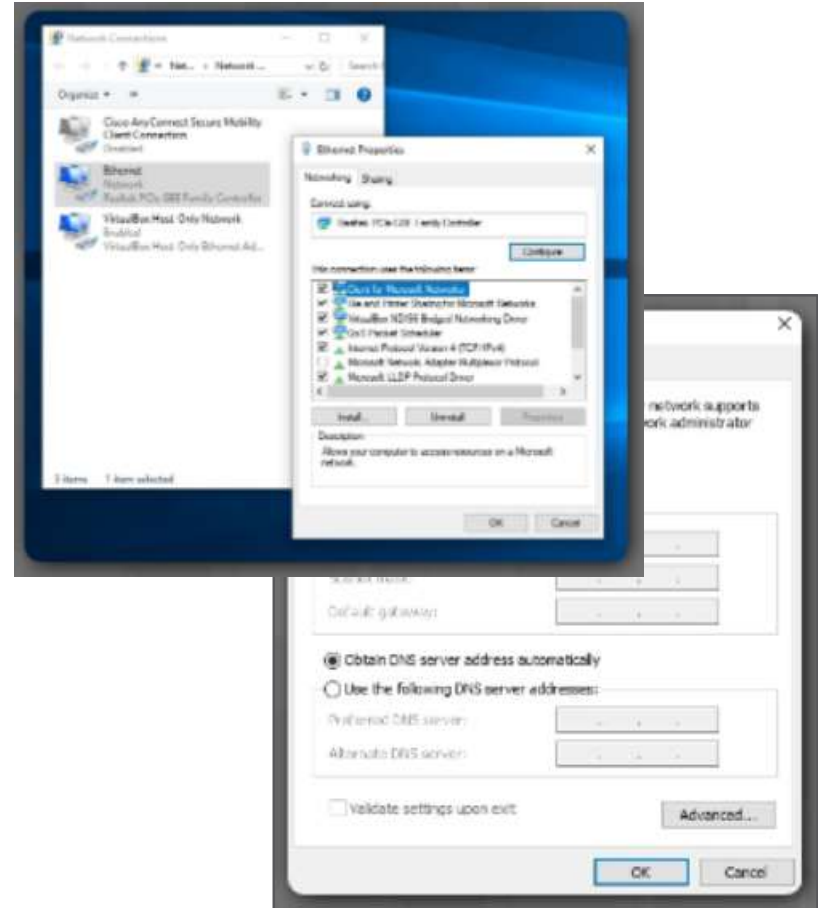
Setting a Network Profile

- The first time a computer with Windows 10 connects to a network, a network profile must be selected. Each network profile has different default settings. Depending on the profile selected, file and printer sharing, or network discovery can be turned off or on, and different firewall settings can be applied.

- Windows 10 has two network profiles:

- **Public** – The public profile disables file and printer sharing and network discovery on the link. The PC is hidden from other devices.

- **Private** – The private profile allows the user to customize the sharing options. This profile is for use on trusted networks. The PC is discoverable by other devices.

← Settings

⌂ Network

Network profile

○ Public
Your PC is hidden from other devices on the network and can't be used for printer and file sharing.

⦿ Private
For a network you trust, such as at home or work. Your PC is discoverable and can be used for printer and file sharing if you set it up.

Configure firewall and security settings

Verify Connectivity with the Windows GUI

- The easiest way to test for an internet connection is to open a web browser and see if the internet is available. To troubleshoot a connection, you can use the Windows GUI or CLI.

- In Windows 10, the status of a network connection can be viewed under the General tab, as shown here. Click the **Details** button to view IP addressing information, subnet mask, default gateway, MAC address, and other information.
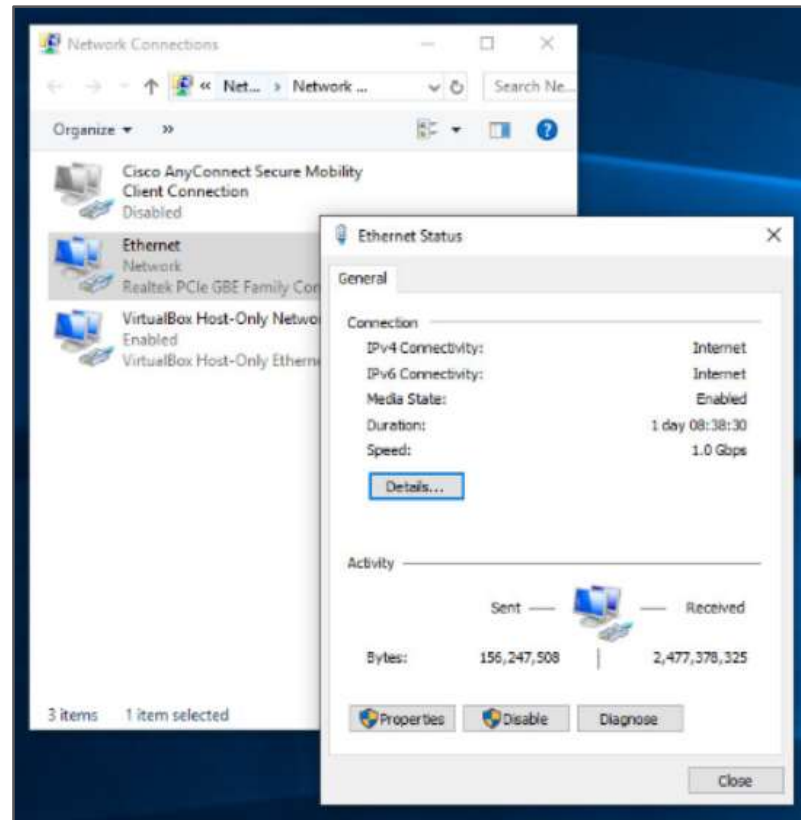
ipconfig Command

ipconfig argument	Description
ipconfig /all	Displays additional network configuration information including DHCP and DNS servers, MAC address, NetBIOS status, and domain name.
ipconfig /release	Releases the IP address learned from the DHCP server resulting in the network adapter(s) no longer having an IP address.
ipconfig /renew	Forces a DHCP client to renew its DHCP address lease from the DHCP server.
ipconfig /displaydns	Displays the DNS resolver cache which contains host and domain names that have been recently queried.
ipconfig /flushdns	Clears the DNS resolver cache on the host.

- The ipconfig command displays basic IP configuration information, including the IP address, subnet mask, and default gateway for all network adapters to which TCP/IP is bound.

- There are several ipconfig switches and arguments which are useful to know. The table in the figure displays available command options. To use a command option, enter the ipconfig /option (e.g., ipconfig /all).

Network CLI Commands

- The following CLI commands that can be executed from the command prompt to test network connectivity:

  - **ping** – The command tests basic connectivity between devices by using ICMP echo request and reply messages.

  - **tracert** – The command traces the route that packets take from your computer to a destination host. At the command prompt, enter **tracert** *hostname.*

  - **nslookup** – The command tests and troubleshoots DNS servers. It queries the DNS server to discover IP addresses or host names. At the command prompt, enter **nslookup** *hostname* to return the IP address for the host name entered. A reverse nslookup command, **nslookup** *IP_address* returns the host name for the IP address entered.

Video Demonstration - Network Testing and Verification with CLI Commands

Video Demonstration: Network Testing and Verification with CLI Commands

In this video demonstration, you will learn how to:

- Use Ipconfig to see additional information
- Use ping command to send echo and replies
- Use ping to request a specific website
- Use nslookup to test DNS
- Use netstat see open ports and connections

Wireless Settings

- Wireless networks can be added in Windows 10 by going to Settings > Network & Internet > Wi-Fi > Manage known networks

  - Enter the network name and select a security type that matches the configuration on the wireless router.

- There are four security type options:

  - **No authentication (Open)** – Data is sent unencrypted and with no authentication

  - **WEP** – Provides very weak security and should not be relied upon for confidentiality

  - **WPA2**-Personal – Uses the Advanced Encryption Standard (AES) cipher and a Pre-shared Key (PSK) to encrypt communications

  - **WPA2-Enterprise** – Authentication is passed from the access point to a centralized authentication server running Remote Authentication Dial-in User Service (RADIUS)
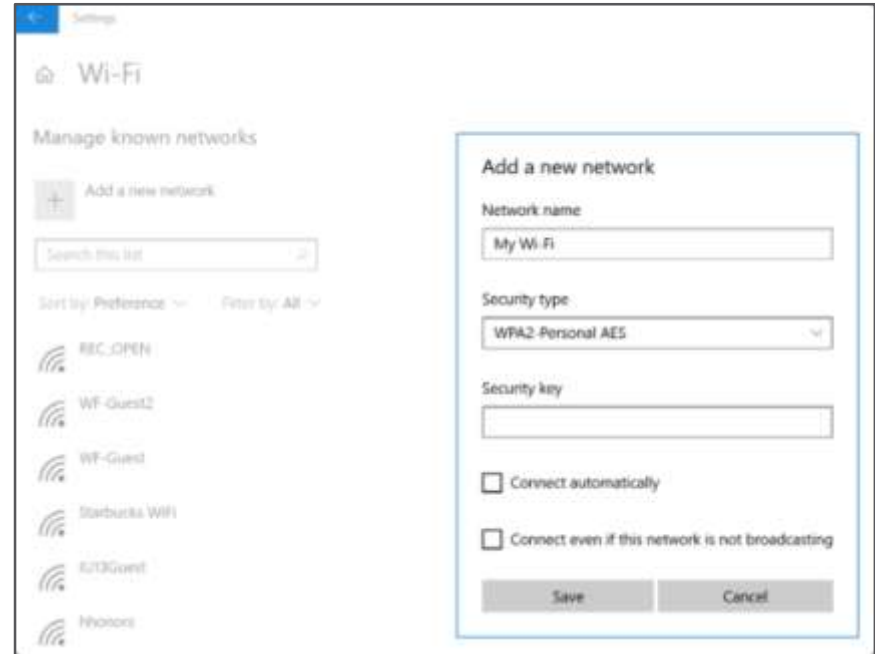
Lab – Connect and Test the Wireless Connection

In this lab, you and your partner will connect your computers to a wireless router and test the wireless connection.

VPN Access in Windows

- A VPN is a private network that connects remote sites or users together over a public network, like the internet.

- When VPN connects to the corporate private network, users become part of that network and have access to all services and resources as if they were physically connected to it.

- Remote-access users must install a VPN client on their computers to form a secure connection to a corporate private network.

- The VPN software encrypts data before sending it over the internet.

- VPN gateways establish, manage, and control VPN connections, also known as VPN tunnels.

- A VPN in Windows 10 can be set up from the Network and Sharing Center.

Remote Access Protocols
Telnet and SSH

- Telnet is sometimes used for troubleshooting services or connecting to routers and switches.

- Telnet messages are sent in clear text so anyone with a packet sniffer can capture and see the contents of Telnet messages.

- Secure Shell (SSH) is an encrypted alternative to Telnet and other file copy programs such as FTP. SSH communicates over TCP port 22.

- SSH server authentication methods include:

  - **Username/Password** - The client sends credentials to the SSH host, which are then verified

  - **Kerberos** - Networks which use Kerberos authentication protocol, such as Windows Active Directory, allow for Single Sign-On (SSO)

  - **Host-based authentication** - The client requests authentication with a public key. The server generates a challenge with this key which the client must decrypt with the matching private key

  - **Public key authentication** - The user enters a passphrase to access the private key.

Packet Tracer - Using Telnet and SSH

In this Packet Tracer activity, you will establish remote sessions to two routers, using Telnet and SSH. You may also install a third-party terminal emulation program and access a dedicated SSH server provided by your instructor.

Video Demonstration – Remote Desktop and Remote Assistance

Video Demonstration: Remote Desktop and Remote Assistance

In this video demonstration, you will learn how to:

- Allow remote user to connect to a machine across the network

- Modify Remote Desktop Settings

- Allows a user to use Remote Assistance with an invite

Lab – Windows Remote Desktop and Assistance

In this lab, you will partner with another student so you can configure a Remote Desktop connection for your partner and invite your partner to provide assistance on your computer via a Remote Assistance connection.

11.6 Common Preventive Maintenance Techniques for Operating Systems

Preventive Maintenance Plan Contents

- A preventive maintenance plan provides many benefits to users and organizations such as decreased downtime, improved performance, improved reliability, and lower repair costs.

- Preventive maintenance plans should prioritize equipment that would affect the organization the most if that equipment fails.

- Preventive maintenance for an OS includes automating tasks to perform scheduled updates, and installing service packs.

- Preventive maintenance includes the following important tasks: hard drive error checking, defragmentation, and backup, updates to the operating system, applications, antivirus, and other protective software.

Lab – Manage the Startup Folder

In this lab, you will learn how to manage the Startup folder.

OS Preventive Maintenance Plan
Windows Updates

- Windows Update is a website located at update.microsoft.com. The site hosts maintenance updates, critical updates, and security patches as well as optional software and hardware updates for Microsoft Windows versions 7, 8 and 10.

- Microsoft releases updates on the second Tuesday of each month, unofficially known as Patch Tuesday.

- Windows 10 automatically downloads and installs updates to make sure your device is secure and up to date.

- You can manually check for updates in Windows 10 via Settings > Update and Security.
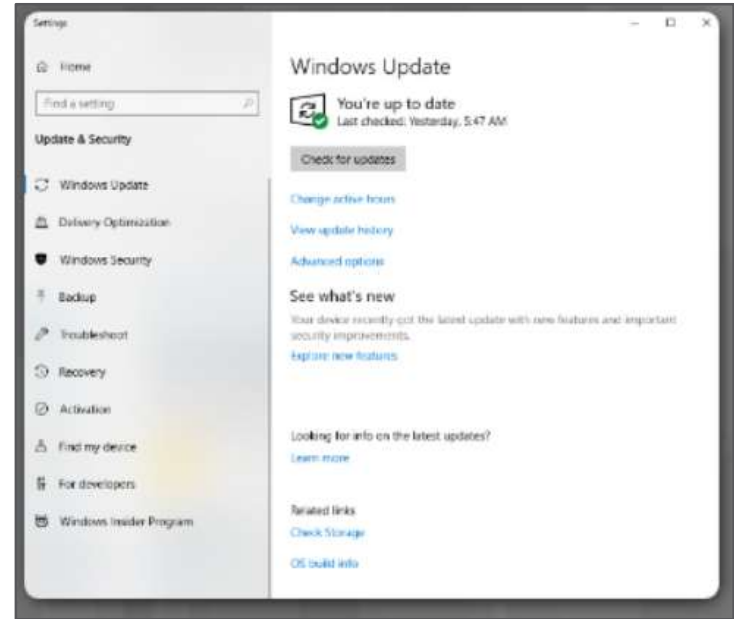
Video Demonstration – Scheduling Tasks

Video Demonstration: Scheduling Tasks

In this video demonstration, you will learn how to:

- Locate Task Scheduler

- Create a basic task with a task trigger

Lab – Schedule a Task Using the GUI and at the Command Line

In this lab, you will schedule a task using the Windows Task Scheduler utility. You will then make changes to your task and test your task by running it.
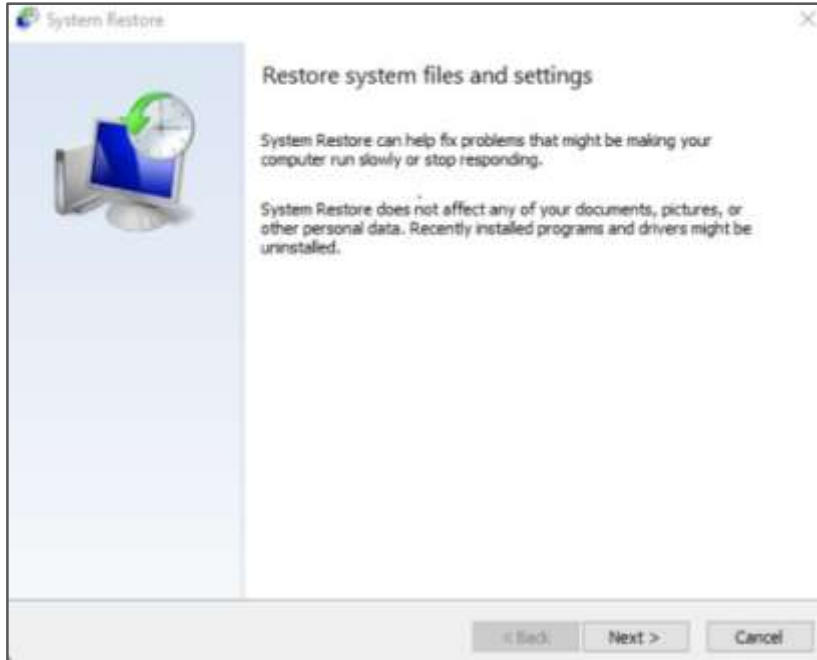
Restore Points

- Sometimes installing an application or hardware driver can cause instability or create unexpected problems.

- If uninstalling the application or hardware driver doesn't correct the problem you can restore the computer to a previous point in time with the System Restore utility.

- If a computer crashes or if an update causes a problem, the computer can be rolled back to a previous configuration using a restore point.

- System restore does not back up personal data files, nor does it recover personal files that have been corrupted or deleted.

- Create a restore point before making changes to a system in the following situations:

  - When updating the OS

  - When installing or upgrading hardware

  - When installing an application

  - When installing a driver

Backup and Restore
Hard Drive Backup
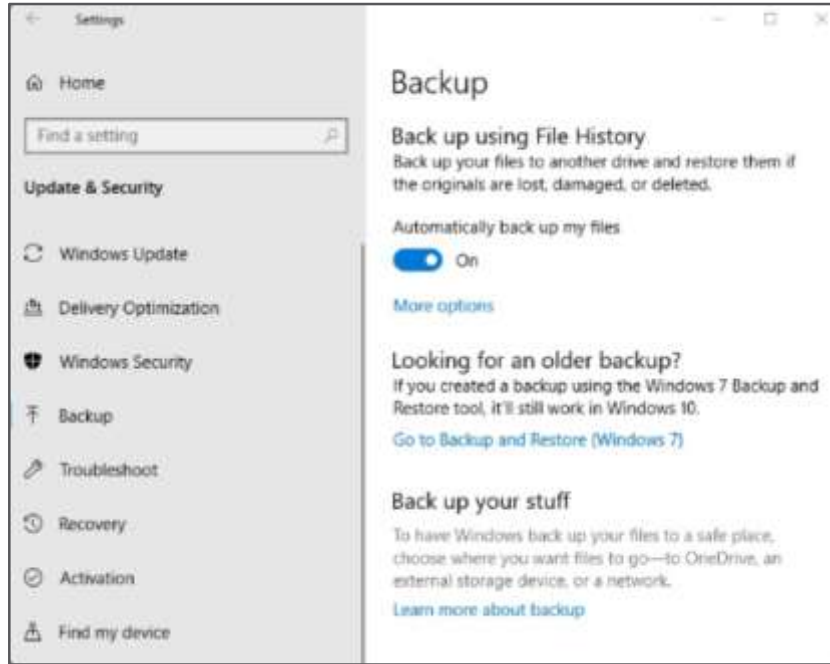
- It is important to establish a backup strategy that includes data recovery of personal files. You can use the Microsoft Backup utility to perform backups as required.

- It can take a long time to run a backup. If the backup strategy is followed carefully, it is not necessary to back up all files every time. Only the files that have changed since the last backup need to be backed up.

- The backup tool included with Windows 7 allowed users to back up files, or create and use a system image backup, or repair disc. Windows 8 and Windows 10 ship with **File History** which can be used to back up the files in the Documents, Music, Pictures, Videos, and Desktop folders. Over time, File History builds a history of your files, allowing you to go back and recover specific versions of a file.

- File History in Windows 10 is located in **Settings > Update&Security > Backup**, as shown here.

Video Demonstration - Hard Drive Backup Tools

Video Demonstration: Back up and Restore

In this video demonstration, you will learn how to:

- Locate Back up in Update and Security

- Back up using File History

- Set up recurring back ups and length back ups will be saved

- Restore a file from a current back up

Lab – System Restore and Hard Drive Backup

In this lab, you will create a restore point and use it to restore your computer. You will also configure a hard drive backup.

11.7 Applying Troubleshooting Process to Windows Operating Systems

The Six Steps of the Troubleshooting Process

Step 1. Identify the problem.

Step 2. Establish a theory of probable cause.

Step 3. Test the theory to determine the cause.

Step 4. Establish a plan of action to resolve the problem and implement the solution.

Step 5. Verify full system functionality and if applicable, implement preventive measures.

Step 6. Document findings, actions, and outcomes.

Identify the Problem

Step 1. Identify the problem.	
Open-ended questions	• What problems are you having? • What operating system is installed on the computer? • What updates have you performed lately? • What programs have you installed recently? • What were you doing when the problem was discovered?
Closed-ended questions	• Can you start the operating system? • Can you start the operating system in safe mode? • Have you changed your password recently? • Have you seen any error messages on the computer? • Has anyone else used the computer recently? • Has any hardware been added recently?

Establish a Theory of Probable Cause

Step 2. Establish a theory of probable cause.	
Common causes of operating system problems	• Incorrect settings in BIOS • Caps lock key is set to on • Non-bootable media during computer boot up • Password has changed • Incorrect monitor settings in control panel • Operating system update failure • Driver update failure • Malware infection • Hard drive failure • Corrupt operating system files

Test the Theory to Determine Cause

Step 3. Test the theory to determine the cause.	
Common steps to determine cause	• Log in as a different user • Use third party diagnostic software • Determine if new software or software updates have just been installed • Uninstall recently installed applications • Boot into safe mode to determine if the problem is driver-related • Roll back newly updated drivers • Examine Device Manager for device conflicts • Examine Event logs for warnings or errors • Check the hard drive for errors and fix file system issues • Use the system file checker to recover corrupt system files • Use system restore if a system update or service pack has been installed

Establish a Plan of Action to Resolve the Problem and Implement the Solution

Step 4. Establish a plan of action to resolve the problem and implement the solution.	
If no solution is achieved in the previous step, further research is needed to implement the solution.	• Helpdesk repair logs • Other technicians • Manufacturer FAQ websites • Technical websites • News groups • Computer manuals • Device manuals • Online forums • Internet search

Verify Full System Functionality and if Applicable, Implement Preventive Measures

Step 5. Verify full system functionality and if applicable, Implement preventive measures.	
Verify full functionality	• Shut down the computer and restart it • Check event logs to make sure there are no new warnings or errors • Check Device Manager to see that there are no warnings or errors • Run DxDiag to make sure DirectX is running correctly • Make sure applications run properly • Make sure network shares are accessible • Make sure the Internet can be accessed • Re-run system file checker to ensure all files are correct • Check Task Manager to ensure that the status of all programs is Running • Re-run any third party diagnostic tools

Document Findings, Actions, and Outcomes

Step 6. Document findings, actions, and outcomes.	
Document findings, actions, and outcomes.	• Discuss the solution implemented with the customer • Have the customer verify that the problem has been solved • Provide the customer with all paperwork • Document the steps taken to solve the problem in the work order and the technician's journal • Document any components used in the repair • Document the time spent to resolve the problem

Common Problems and Solutions

Identify the Problem

The OS locks up.	The computer displays a black or blue screen of death (BSOD)
The keyboard or mouse does not respond.	The computer locks up without any error messages.
The operating system will not start.	An application does not install.
The computer displays an "Invalid Boot Disk" error after POST.	A computer with Windows 7 installed does not run Aero.
The computer displays a "BOOTMGR is missing" error after POST.	The UAC no longer prompts the user for permission.
A service failed to start when the computer booted.	No Gadgets appear on the desktop.
A device did not start when the computer booted.	The computer is running slowly and has a delayed response.
The computer continually restarts without displaying the desktop.	The computer displays a "BCD missing" error While booting.

The OS locks up.

Probable Causes	Possible Solutions
The computer is overheating.	Clean internal components.
Some of the operating system files may be corrupted.	Check the fan connections to ensure fans are operating properly.
The power supply, RAM, hard drive, or motherboard may be defective.	Run the system file checker (SFC) to replace corrupt operating system files.
The BIOS settings may be incorrect.	Test the power supply, RAM, hard drive, or motherboard with third party diagnostic software and replace as necessary.
An unknown event has occurred that has caused the OS to lock up.	Examine and adjust the BIOS settings. Address any events in the Event Log. Install or roll back updated drivers.
An incorrect driver has been	

Show pdf

Advanced Problems and Solutions for Operating Systems

Identify the Problem

The computer displays an "Invalid Boot Disk" error after the POST.	The computer locks up without any error messages.
The computer displays an "Inaccessible Boot Device" error after the POST.	An application does not install.
The computer displays a "BOOTMGR is missing" error after the POST.	The search feature takes a long time to find results.
A service failed to start when the computer booted.	The computer is running slowly and has a delayed response.
A device did not start when the computer booted.	When you run a program, a missing or corrupt DLL message is displayed.
A program listed in the registry is not found.	RAID is not detected during installation.
The computer continually restarts without displaying the desktop.	A system file is corrupted.
The computer displays a black or blue screen of death (BSOD).	Computer boots to safe mode.
A file fails to open.	

The computer displays an "Invalid Boot Disk" error after the POST.

Probable Causes	Possible Solutions
Media that does not have an operating system is in a drive.	Remove all media from the drives.
The boot order is not set correctly in the BIOS/UEFI settings.	Change the boot order in the BIOS/UEFI settings to start with the boot drive.
The hard drive is not detected.	Reconnect the hard drive cables.
The hard drive does not have an operating system installed.	Install an operating system.
The MBR/GPT is corrupted.	Use the bootrec /fixmbr command from the System.
The computer has a boot sector virus.	Recovery options of Windows 7 or Vista.
The hard drive is failing.	Run virus removal software. Replace the hard drive.

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Lab – Troubleshoot Operating System Problems

In this lab, you will diagnose the cause of various operating system problems and solve them.

11.8 Chapter Summary

Windows Configuration

- Configure the Windows Desktop and File Explorer.

- Configure Windows using Control Panels.

- Use Windows tools and utilities to manage Windows systems.

- Use Microsoft Windows command line tools.

- Configure a Windows computer to work on a network.

- Use common preventive maintenance techniques for Microsoft Windows operating systems.

- Troubleshoot Microsoft Windows operating systems.