



Chapter 6: Windows Configuration and Management



IT Essentials v6.0

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Chapter 6 - Sections & Objectives

- 6.1 The Windows GUI and Control Panel
 - Perform routine system management tasks with common Microsoft Windows tools.
- 6.2 Client-Side Virtualization
 - Configure virtualization on a computer.
- 6.3 Common Preventive Maintenance Techniques for Operating Systems
 - Use common preventive maintenance techniques for Microsoft Windows operating systems.
- 6.4 Basic Troubleshooting Process for Operating Systems
 - Explain how to troubleshoot Microsoft Windows operating systems.
- 6.5 Chapter Summary



6.1 Windows Desktop, Tools, and Applications



Windows Desktop, Tools and Applications

- Windows Desktop
 - A graphical representation of the workspace, often called **GUI**.
 - The desktop has icons, toolbars, and menus to manipulate files.
 - Windows 8 introduced a new desktop that uses tiles.
- Desktop Properties
 - The Windows desktop is highly customizable.
 - Possible customizations include: re-arrange titles, change colors and sounds, modify screen resolution.
- To customize the desktop in Windows 7 and Windows Vista, right-click anywhere on the desktop and choose Personalize to:
 - change desktop icons, mouse pointers, and your account picture.
 - modify a theme's background, color, sound, and screensaver.



Windows Requirements

OS	Processor	Memory	Disk Space
Windows 7	1GHz minimum	1GB - minimum 2GB+ - best	16GB – 32-bit 20GB – 64-bit
Windows 8	1GHz minimum	1GB – 32-bit 2GB – 64-bit 4GB recommended	16GB – 32-bit 20GB – 64-bit
Windows 10	1GHz minimum	1GB – 32-bit 2GB – 64-bit 4GB recommended	16GB – 32-bit 20GB – 64-bit

Windows Desktop, Tools and Applications

- Start Menu

- Allow users to manage programs, search the computer, and manipulate running applications.
- The Start Menu can be accessed by clicking the Windows icon.
- Microsoft removed the Start Menu from Windows 8 but added back a limited version of it in Windows 8.1.



File Extensions and Attributes

- Windows file system naming conventions:
 - Maximum of 255 characters may be used.
 - Characters such as a period (.) or a slash (\ /) 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.
- Windows filename extension examples:
 - .docx- Microsoft Word
 - .txt - ASCII text only
 - .jpg - graphics format
 - .pptx - Microsoft PowerPoint
 - .zip - compression format

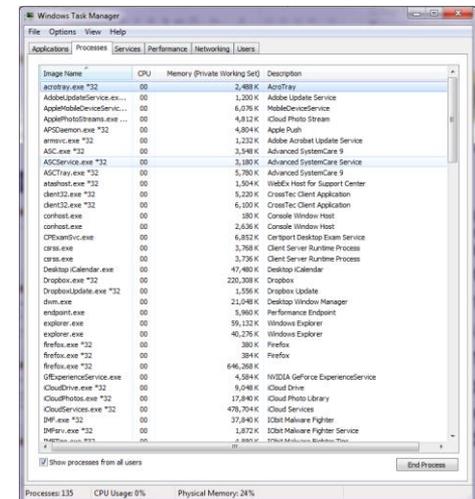
Windows Desktop

- A GUI provides graphical representations of all the files, folders, and programs on a computer.
- Windows 7 and Windows Vista have a default theme called Aero. Aero has translucent window borders, numerous animations, and icons that are thumbnail images of the contents of a file
- Windows 7 includes the following new Aero features:
 - **Shake** -Minimize all windows that are not being used by clicking the title bar of one window and shaking the mouse.
 - **Peek** - View the icons and gadgets on the desktop by pointing the mouse at the right edge of the taskbar to make all windows transparent.
 - **Snap** - Resize a window by dragging it to one edge of the screen.
- **Gadgets** -Windows 7 and Windows Vista users can place Gadgets on the desktop. Gadgets are small applications such as games, sticky notes, or a clock.

Windows Desktop, Tools and Applications (Cont.)

■ Task Manager

- Allows for the management of all applications running on the computer.
 - Check for CPU usage
 - While presenting essentially the same information, Windows 8 has different tabs than Windows 7 & Vista.
- To customize the Start Menu or the Taskbar, right-click it and choose Properties.
- Allows you to view all applications that are running and to close any applications that have stopped responding:
- CTRL-ALT-DEL and select Start Task Manager.
 - Right-click the taskbar and select Start Task Manager.



Windows Desktop, Tools and Applications (Cont.)

- **Computer and Windows Explorer**
 - File Explorer and Windows Explorer are similar file manager applications.
 - This PC and Computer features grant access to various drives.
- **Windows Libraries**
 - Allows for easy organization of content; no need to move files.
 - Presents content from different locations in the same folder.
- **Install and Uninstall Applications**
 - The installation process copies all necessary files to the proper disk location.
 - Setup.exe usually starts Windows installation processes.
 - The uninstall process removes the application and its related files.



Program Compatibility

Some older programs may not run or functions correctly in Windows 7. You have two options:

- Run the program in Compatibility Mode.
 - Found in the properties of the executable
- Run in XP Mode
 - Can be downloaded for free from Microsoft
 - Only available in Windows 7 Professional and higher

Computer and Windows Explorer

- Computer allows access to the various installed drives (My Computer in Windows XP)
- Windows Explorer - used to navigate the file system includes:
 - Search box - Access previous searches. Filter search results.
 - New folder button - Create new folders with one click.
 - Arrange by - Organize items easily according to different criteria.
 - Preview pane button - Turn the preview pane on or off.
- Applications can be launched in several ways:
 - Click the application on the Start menu or Taskbar.
 - Double-click the application shortcut icon on the desktop.
 - Double-click the application executable on the desktop or in Windows Explorer.
 - Launch the application from the Run window or command line.

Windows 7 Libraries

- Allows for easy organization of content from storage devices on local computer and network.
- Are virtual folders that present content from different locations within the same view.
- Include four default Libraries - Documents, Music, Pictures, and Videos.
- To add a file to a library, right-click it, select Include in library, and then choose which library to add the item.
- To create a new library, open a folder and select Include in Library > Create new library

Control Panel Utilities

- Introduction to Control Panel Utilities
 - Centralizes the settings for many features.
 - Settings are categorized in utilities, or small programs.
- User Accounts
 - Allows for account management.
 - **UAC** monitors programs and issues alerts upon system threatening actions.
- Internet Options
 - Allows for configuring Windows Internet settings.
 - Internet Options tabs are General, Security, Privacy, Content, Connections, Programs, Advanced.
- Display Settings
 - Allows for configuring video-related settings.
 - Screen resolution, orientation, single/multiple displays are a few of the settings available under Display Settings.



Control Panel Utilities (Cont.)

- Folder Options
 - Allows for configuring folder-related settings.
 - Allows for adjusting the behavior of folder browsing, how files are opened and displayed and more.
- Action Center
 - Centralized location to view alerts that help keep Windows running smoothly.
 - Divided into Security and Maintenance sections.
 - Messages highlighted in red should be addressed quickly; yellow-highlighted items indicate recommended tasks.
- Windows Firewall
 - Helps prevent malicious attacks to the computer.
 - Allows for adjusting firewall settings for home, work or public networks.
 - Firewall settings include allowing a specific program through the firewall, turning the firewall on or off and managing firewall notifications.



Control Panel Utilities (Cont.)

- **Power Options**
 - Allows for adjusting power consumption.
 - Power plans can be customized to control how the computer and its components use power.
- **System Utility**
 - Acts as a system information hub.
 - Allows users to view basic system information, access tools, and configure advanced system settings.
- **Device Manager, Devices and Printers and Sound**
 - Device Manager provides a list of all the devices installed in the computer and their statuses.
 - Device Manager is a useful troubleshooting tool.
 - Devices and Printers displays devices connected to the computer through a port or network connection.
 - The Sound utility allows for configuring audio devices or changing the sound scheme of the computer.



Control Panel Utilities (Cont.)

- Region, Programs and Features and Troubleshooting
 - Region (Win8) allows for changing the format of numbers, currencies, dates, and time.
 - Language (Win8) allows for changing the primary language or install an additional language.
 - In Win 7 & Vista both tools are combined into the Region and Language tool.
 - Programs and Features allows for uninstalling programs or for changing a program's configuration.
 - The Troubleshooting tool has a number of built-in scripts to identify and solve problems.
- HomeGroup and Network and Sharing Center
 - HomeGroup allows Windows computers to share resources.
 - HomeGroup is available on Windows 7 or higher.
 - Network and Sharing Center allows for configuring and reviewing all network operations in a Windows computer.

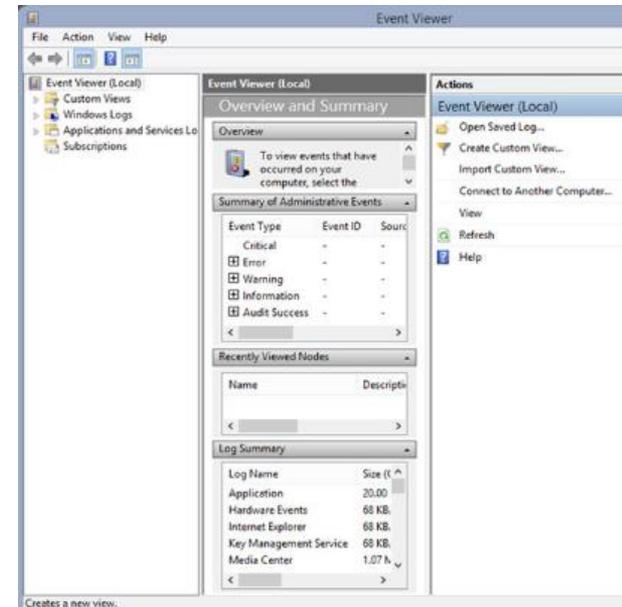


Control Panel Utilities (Cont.)

- **System and Security** - To configure system and security settings
- **Network and Internet** - To configure network connection types
- **Hardware and Sound** - To configure devices connected to the computer and settings for sound
- **Programs** - To remove, change, and repair applications
- **User Accounts and Family Safety** - To create and remove user accounts and set up parental controls
- **Appearance and Personalization** - To control the look and feel of the Windows GUI
- **Clock, Language, and Region** - To specify location and language
- **Ease of Access** - To configure Windows for vision, hearing, and mobility needs

Administrative Tools

- **Computer Management**
 - Allows for the management of many aspects of the computer and remote computers in one tool.
 - Provides access to a number of utilities: Task Scheduler, Event Viewer, Shared Folders, Local Users and Groups, Performance, Device Manager and Disk Management.
- **Event Viewer**
 - Logs the history of application, security, system events.
 - These log files are a crucial when troubleshooting.
- **Services**
 - Allows for the management of all the services on your computer and remote computers.
 - Services can be configured to start automatically, automatically with delay, or manually.

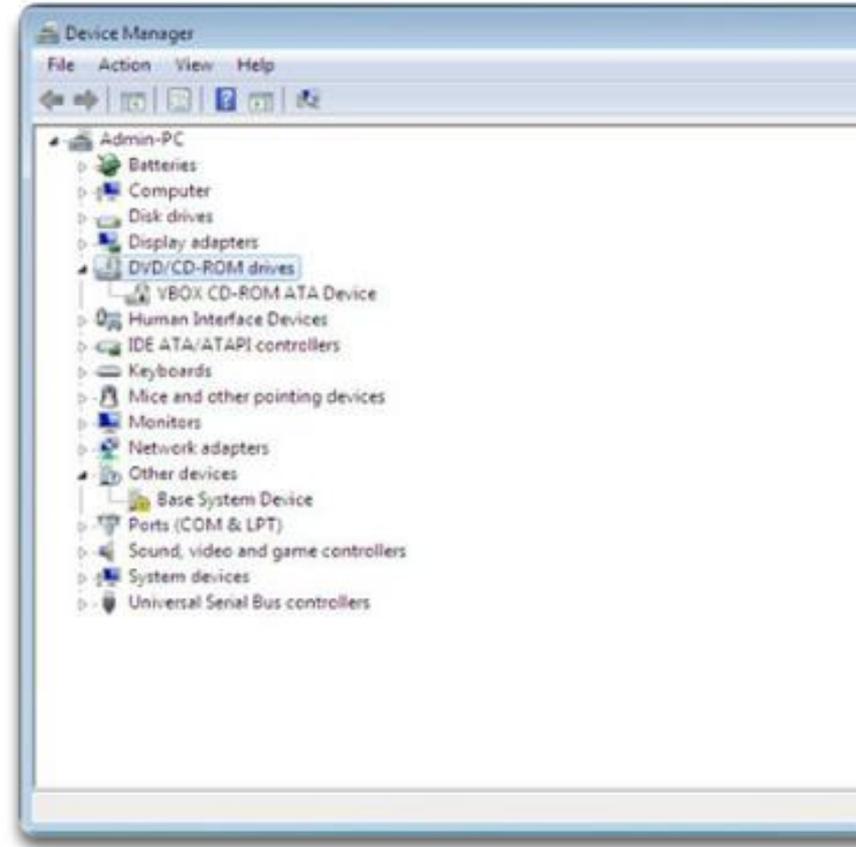


User Accounts

- **User Accounts Utility:**
 - Create a user account.
 - Manage password, change picture, change account name and type, manage another account, and change User Account Control (UAC) settings.
 - Start > Control Panel> select User Accounts
- **User Account Control (UAC):**
 - Monitors programs on a computer and warns users when an action might present a threat to the system.

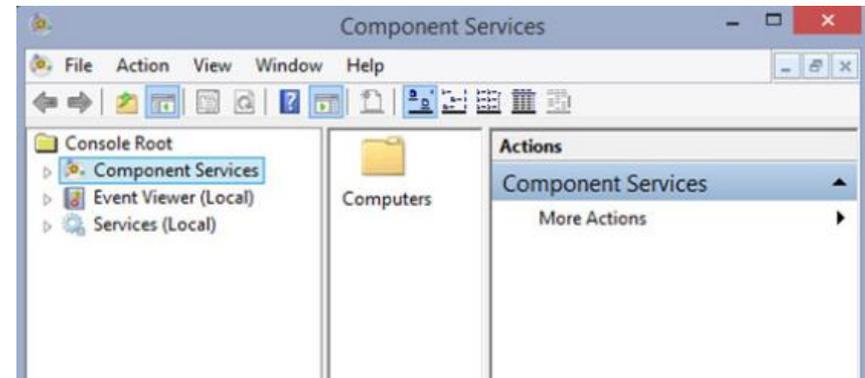
Device Manager

- View settings for devices in the computer and:
 - 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
 - Disable a device
- Start > Control Panel > System > Device Manager



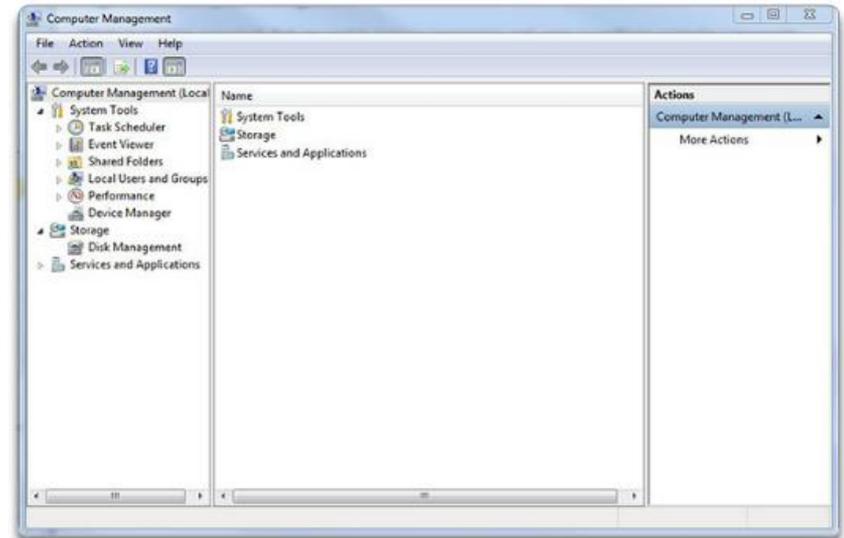
Administrative Tools (Cont.)

- System Configuration
 - Used to identify problems that keep Windows from starting correctly.
 - Services and startup programs can be turned off to help troubleshooting.
- **Performance Monitor** and Windows Memory Diagnostics
 - Displays an overview of the Performance Monitor and System Summary.
 - System Summary displays real-time information about the processors, disks, memory, and network usage.
 - System Summary displays detailed data about the resources currently in use.



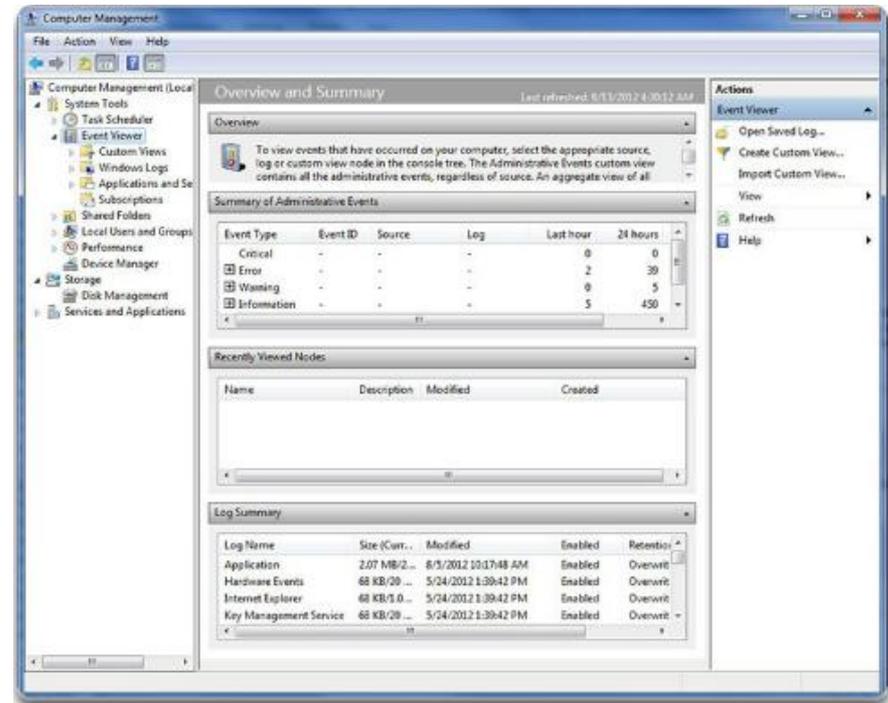
Microsoft Management Console

- Allows an administrator to organize computer management tools in one location for convenient use:
 - Task Scheduler
 - Event Viewer
 - Shared Folders
 - Local Users and Groups
 - Performance
 - Device Manager
 - Disk Management
- Start > Control Panel > Administrative Tools > Computer Management



Event Viewer

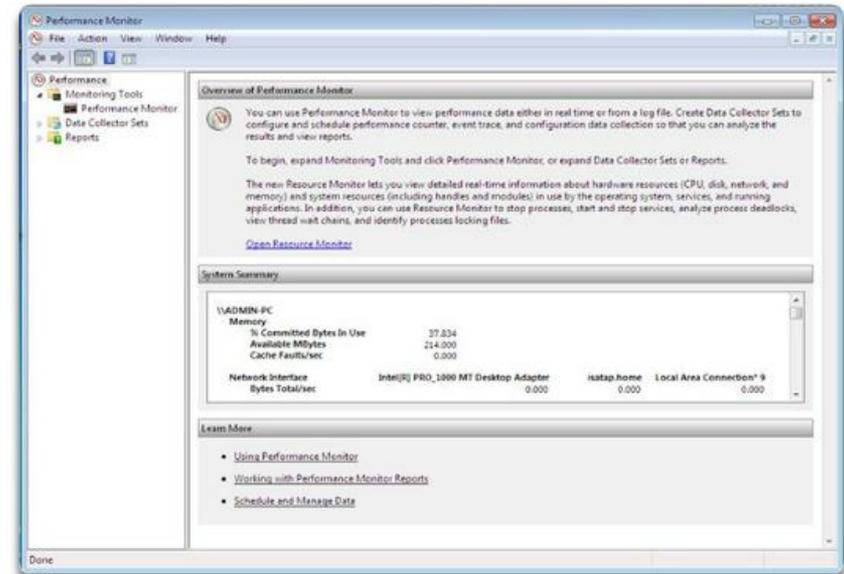
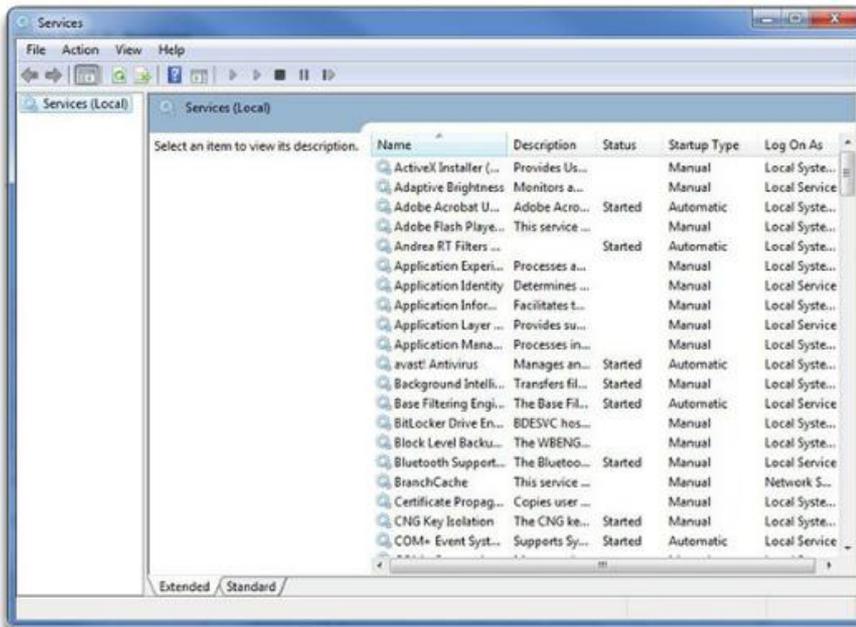
- Logs a history of events regarding applications, security, resources, and the system.
- These log files are a valuable troubleshooting tool.
- Start > Control Panel > Administrative Tools > Event Viewer



Services and Performance Monitor

Services:

- Start, stop, or disable services.
- Must be set to **start** for a service to automatically start on boot.
- Start > Control Panel > Administrative Tools > Services.

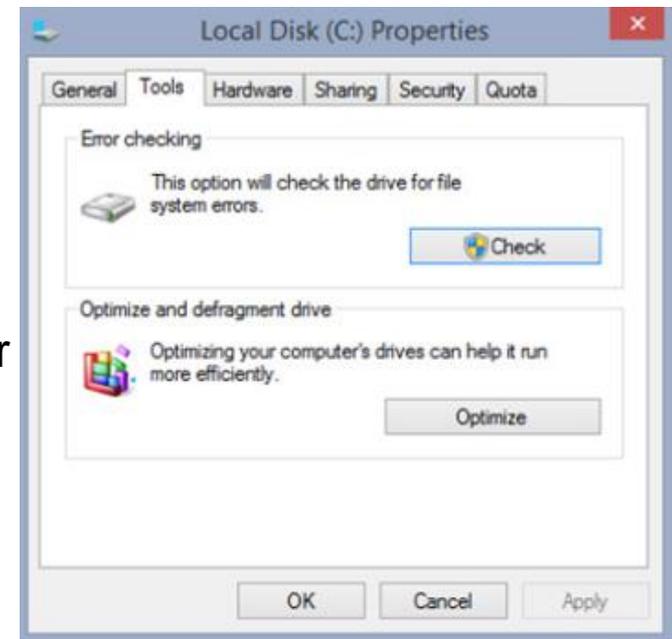


Performance Monitor:

- Record performance data and configure alerts.
- Display computer resources used.
- Start > Control Panel > Administrative Tools > Performance Monitor

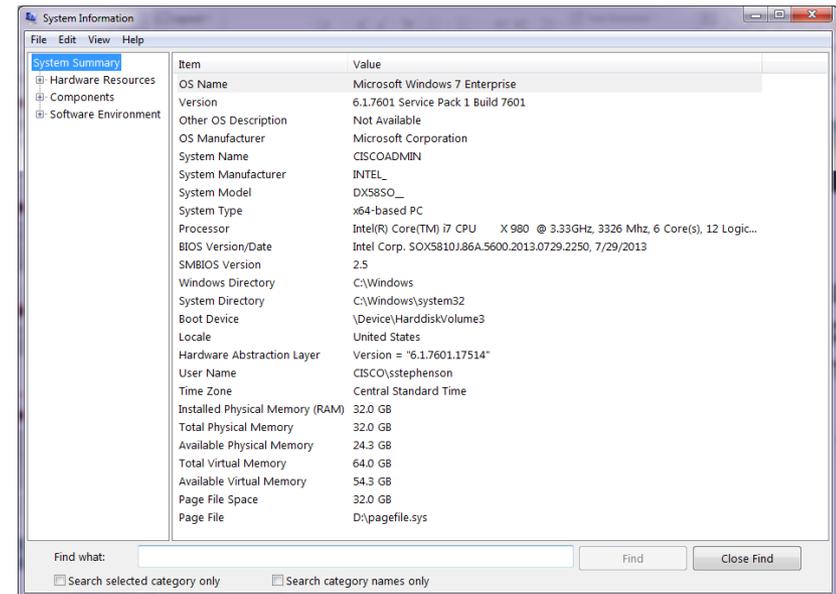
Disk Defragmenter and Disk Error-Checking Tool

- Disk Defragmenter and Disk Error-Checking Tool
 - **Disk Defragmenter** makes files on the hard drive contiguous and speeds up the reading of files
 - SSDs do not need user-triggered defragmentation; the drive controller defrags as it writes to the disk.
 - Disk Error-Checking scans the hard drive for file structure or disk surface errors.
- To access the Disk Defragmenter in Windows 7, select Start > All Programs > Accessories > System Tools > Disk Defragmenter.
- **CHKDSK** checks the integrity of files and folders by scanning the hard disk surface for physical errors.
- Access CHKDSK from within the Disk Defragmenter or enter CHKDSK in command line to detect and repair disk errors.



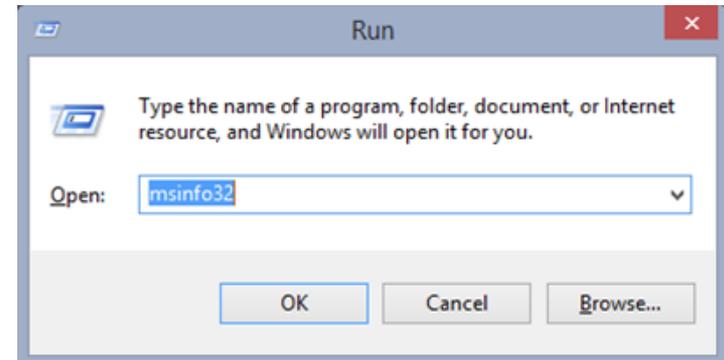
System Information

- Combines information about software, drivers, hardware configurations, and computer components in one place.
- Helpful for support personnel when troubleshooting and diagnosing a computer.
- To access the System Information tool, Start > All Programs > Accessories > System Tools > System Information



Command Line Tools

- Windows Command Line Interface
 - CLI is a text-based interface.
 - CLI can be useful when troubleshooting OS problems, especially if the GUI is inoperative.
- System Utilities
 - Run Line utility allows for invoking a tool by typing its name; no need to find the icon and click it.
 - A few common tools include:
 - **CMD** –Used to execute command line programs
 - **DXDIAG** - Displays details for all DirectX components and drivers
 - **EXPLORER** – Opens Windows Explorer
 - **MMC** - Opens the Microsoft Management console (MMC)
 - **MSCONFIG** - Opens the System Configuration Utility
 - **MSINFO32** - Displays complete system summary of the computer
 - **NOTEPAD** – Open the basic text editor
 - **REGEDIT** – Opens the Registry Editor
 - **AT** – Used to schedule a program to run at a specific time

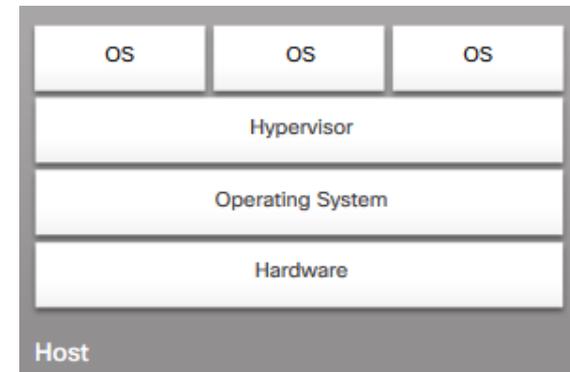
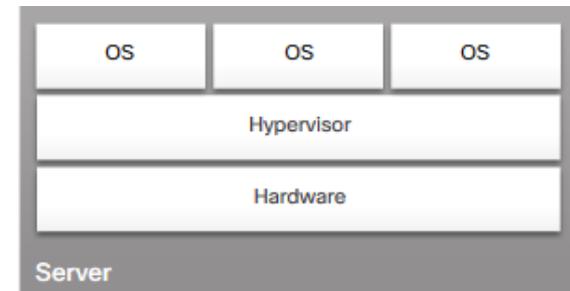


6.2 Client-Side Virtualization



Purpose and Requirements of Virtualization

- Purpose of Virtual Machines
 - Provides staff with critical resources.
 - Reduced computer hosting costs.
 - Provides access to tools not available on a specific OS.
- Hypervisor: Virtual Machine Manager
 - The software that manages the VMs on a host machine.
 - Hypervisors allocate physical system resources to each virtual machine as needed.
 - Hypervisors can be Type 1 (native) or Type 2 (hosted).
- Virtual Machine Requirements
 - All VMs have basic system requirements.
 - The host machine must have enough resources to meet all the VMs it hosts.
 - VMs are also susceptible to malicious attacks.



Virtualization

- It allows multiple operating systems to run on a single PC simultaneously.
- It can provide cost savings.
- Host machine uses its system resources to host a virtual machine.
- Hosting a virtual machine allows users to access the functionality and resources provided by an OS that is not on the local PC.
- Provides access to applications, file-sharing services, and other productivity tools not supported on the physical machine.
- Users can further increase the functionality of their system by running multiple virtual machines.
- Virus and worm attacks are more easily controlled in a virtualized environment, thus helping to protect the network and its devices from attack.

Virtualization

- The software that creates and manages a virtual machine on a host machine is called the **hypervisor**, or **Virtual Machine Manager (VMM)**.
 - Allocates the physical system resources, such as CPU, RAM, and hard drive, to each virtual machine as needed.
- There are two types of hypervisors:
 - **Type 1** (native) hypervisor runs directly on the hardware of a host and manages the allocation of system resources to guest operating systems
 - **Type 2** (hosted) hypervisor is hosted by an OS
 - Virtual PC, VirtualBox, VMware Workstation/Player

Virtual Machine PC Requirements

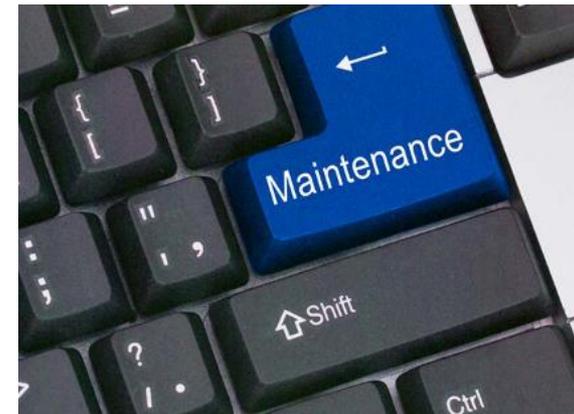
Processor	<ul style="list-style-type: none"> • 1 GHz • 32-bit/64-bit Processor
Hard Disk Space	15 GB per Virtual OS
Memory	2GB
Supported Host Operating Systems	<ul style="list-style-type: none"> • Windows 7 Home Basic • Windows 7 Home Premium • Windows 7 Enterprise • Windows 7 Professional • Windows 7 Ultimate
Supported Guest Operating Systems	<ul style="list-style-type: none"> • Windows XP • Windows Vista • Windows 7

6.3 Common Preventive Maintenance Techniques for Operating Systems



OS Preventive Maintenance Plan

- Preventive Maintenance Plan Contents
 - The plan includes detailed information about the maintenance of all computers and network equipment.
 - Prioritizes mission critical equipment.
 - Includes installing service packs and various updates, disk backups and disk error checking.
- Updates
 - Driver updates help ensure hardware optimal operation.
 - OS updates address security, performance and stability issues.
 - Firmware updates can enable new features and also improve hardware performance and stability.
- Scheduling Tasks
 - Some preventive tasks can be configured to run at an assigned time.
 - Use either Windows Task Scheduler or the **at** command.



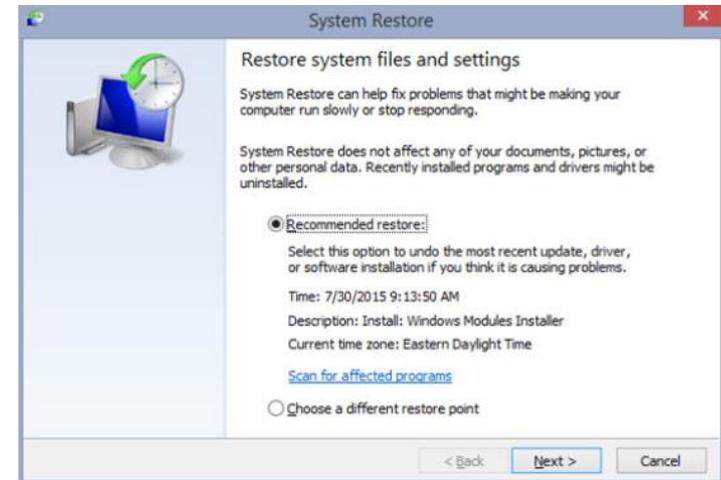
OS Preventive Maintenance Plan (Cont.)

■ Restore Points

- Contain information about the OS, installed programs, and registry settings.
- This information allows the computer to revert back to a previous operational state in case of failure.

■ Hard Drive Backup

- Backup strategies are crucial.
- If done properly, it is not necessary to back up all files.
- Windows 8.1 includes File History.
- Windows 7 and Vista include Backup and Restore.



Schedule Tasks

- The CLI **AT** command launches tasks at a specified time using the command line interface.
- The **Windows Task Scheduler** launches tasks at a specified time using a graphical interface.
- To access the Windows Task Scheduler in Windows 7 and Windows Vista, select Start > All Programs > Accessories > System Tools > Task Scheduler.
- Both of these tools allow users to set commands to run at a certain time just once, or to repeat at selected days or times.

Restore Point

- Restore points are useful to return a computer to an earlier time when the system worked.
- If a computer crashes, the OS can roll back to a restore point using the System Restore Utility.
 - The restore utility only operates on OS system and registry settings.
 - Anti-virus software should be run to remove malware before creating a restore point.
- When to create a restore point:
 - Before updating or replacing the OS.
 - When installing or updating hardware.
 - When an application or driver is installed.
- Start > All Programs > Accessories > System Tools > System Restore



Backup the Hard Drive

- Use the **Microsoft Backup Tool** to perform backups.
- Establish a backup strategy that will allow for the recovery of data.
- Decide how often the data must be backed up and the type of backup to perform.
- It is only necessary to make copies of the files that have changed since the last backup.
- To access the backup utility in Windows 7, select Start > Control Panel > Backup and Restore.
- You can create a system image to restore a system from a catastrophic failure.

Types of Backups

	Description	Clear marker
Normal	Selected files and folders	Yes
Copy	Selected files and folders	No
Differential	Selected files and folders that changed since the last backup	No
Incremental	Selected files and folders that changed since the last backup	Yes
Daily	Selected files and folders that changed during the day	No

6.4 Basic Troubleshooting Process for Operating Systems



Troubleshooting Process

- Step 1** Identify the problem
- Step 2** Establish a Theory of Probable Cause
- Step 3** Test the Theory to Determine Cause
- Step 4** Establish a Plan of Action to Resolve the Problem and Implement the Solution
- Step 5** Verify Full System Functionality and Implement Preventive Measures
- Step 6** Document Findings, Actions, and Outcomes

Step 1 - Identify the Problem

- Computer configuration
 - Operating system, patches and updates, network environment, connection type
- Open-ended questions
 - What problems are you experiencing with your computer?
 - What software has been installed on your computer recently?
 - What were you doing when the problem was identified?
 - What operating system do you have installed on your computer?
 - What updates or patches have been installed on your computer?
- Closed-ended questions
 - Has anyone else used your computer recently?
 - Does the computer boot up successfully?
 - Have you changed your password recently?
 - Have you received any error messages on your computer?

Step 2 - Establish a Theory of Probable Causes

- Create a list of the most common reasons why the error would occur and list the easiest or most obvious causes at the top with the more complex causes at the bottom.
 - Incorrect settings in BIOS
 - Caps lock key is set to ON
 - Non-bootable media in the floppy drive 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

Step 3 - Test the Theory to Determine Cause

- Testing your theories of probable causes one at a time, starting with the quickest and easiest.
 - Log in as a different user.
 - Use third party diagnostic software.
 - 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.

Step 4 - Establish a Plan of Action to Resolve the Problem and Implement the Solution

- If a quick procedure does not correct the problem, you might need to research the problem further to establish the exact cause.
- Divide larger problems into smaller problems that can be analyzed and solved individually.
- Create a list of possible solutions and implement them one at a time. If you implement a possible solution and it does not work, reverse the solution and try another.

If no solution is achieved, where can further research be done in order to implement a solution?

- Helpdesk Repair Logs
- Other Technicians
- Manufacturer FAQs
- Technical Websites
- News Groups
- Computer Manuals
- Device Manuals
- Online Forms
- Internet Search

Step 5 - Verify Full System Functionality and Implement Preventive Measures

- Verifying full system functionality and implementing any preventive measures if needed.
 - 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.
 - Re-run scandisk to make sure no problems remain on the hard drive.
 - Check task manager to ensure no programs are running incorrectly.
 - Re-run any third party diagnostic tools.
- Have the customer verify the solution and system functionality.

Step 6 - Document Findings, Actions, and Outcomes

- Discuss the solution with the customer.
- Have the customer confirm that the problem has been solved.
- Give the customer all appropriate paperwork.
- Document the process in the work order and in your technician's journal:
 - Problem description
 - Solution
 - Components used
 - Amount of time spent in solving the problem

Common Problems and Solutions

- Some OS problems are more common than others.
- OS problems are usually caused by hardware, application or configuration issues.
- A few common OS problems include:
 - OS locks up
 - The keyboard or mouse does not respond.
 - The OS will not start.
 - The computer displays a “BOOTMGR is missing” error after POST.
 - A service failed to start when the computer booted.
 - A device did not start when the computer booted.
 - The computer continually restarts without displaying the desktop.
 - The computer displays a black or blue screen of death.

6.5 Chapter Summary



Summary

This chapter covered Windows configuration and management. As a technician, you should be skilled at installing, configuring, and troubleshooting an operating system. The following concepts from this chapter are important to remember:

- Several different operating systems are available, and you must consider the customer's needs and environment when choosing an OS.
- The main steps in setting up a customer's computer include preparing the hard drive, installing the OS, creating user accounts, and configuring installation options.
- A GUI shows icons of all files, folders, and applications on the computer. A pointing device, such as a mouse, is used to navigate in a GUI desktop.
- A CLI uses commands to complete tasks and navigate the file system.
- With a virtual machine manager, system resources on a host computer can be allocated to run virtual machines. Virtual machines run operating systems, and using them can provide users with greater system functionality.
- Preventive maintenance techniques help to ensure optimal performance of the OS. You should establish a backup strategy that allows for the recovery of data.
- Some of the tools available for troubleshooting an OS problem include administrative tools, system tools, and CLI commands.

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