

Chapter 12: Advanced Operating Systems



IT Essentials: PC Hardware and Software v4.1

Chapter 12 Objectives

- 12.1 Select the appropriate operating system based on customer needs
- 12.2 Install, configure, and optimize an operating system
- 12.3 Describe how to upgrade operating systems
- 12.4 Describe preventive maintenance procedures for operating systems
- 12.5 Troubleshoot operating systems

Brands and Versions of Operating Systems

- Various brands of operating systems
 - Microsoft Windows
 - Apple Mac OS
 - UNIX and Linux
- Several versions or distributions
 - Windows 2000 Professional
 - Windows XP Home, Professional or Media Center Editions
 - Windows Vista Home Basic, Business and Premium Editions
- Compare OS versions or editions to find the best one for your customer



Operating Systems Capabilities

- An operating system is the interface between the user and the computer.
 - Provides a bridge between the hardware and applications
 - Creates a file system to store data
 - Manages applications
 - Interprets user commands

- Operating systems have minimum requirements for hardware.

Network Operating System (NOS)

- A **network operating system (NOS)** is an operating system that contains additional features to increase functionality and manageability in a networked environment.
- Examples of network operating systems:
 - Windows 2000 Server, Windows 2003 Server, and UNIX
- Network operating systems provide several protocols designed to perform network functions.

Windows OS Directory Structure

- During installation, the Windows setup program creates directories that have specific purposes:
 - User File - C:\Documents and Settings\User_name\My Documents\
 - System File - C:\Windows\system32
 - Fonts - C:\Windows\Fonts
 - Temporary Files - C:\Documents and Settings\User_name\Local Settings\Temp
 - Program Files - C:\Program Files
 - Offline Files and Folders - C:\Windows\CSC

- Offline Files and Folders help mobile users be more productive.

Install, Configure, and Optimize an OS

To install Windows XP Professional:

1. Insert the installation CD
2. An installation wizard asks a series of questions
3. The wizard completes the installation automatically



Default and Custom Installations

- A **default installation** requires minimal user interaction.
- A **custom installation** allows the user to customize the regional settings and the network settings.
- The technician can automate and customize a Windows XP Pro installation to include the following features:
 - Productivity applications, such as Microsoft Office
 - Custom applications
 - Support for multiple languages
 - OS Deployment Feature Pack using Microsoft Systems Management Server (SMS)
 - Hardware device drivers



Windows XP Custom Install Methods

- **Unattended installation** from a network distribution point using an answer file.
- **Image-based installation** using Sysprep and a disk-imaging program, which copies an image of the operating system directly to the hard drive with no user intervention.
- **Remote installation** using Remote Installation Services (RIS), which can download the installation across the network.
- **OS Deployment Feature Pack** using Microsoft Systems Management Server (SMS), which can dramatically simplify deployment of an operating system across the organization.

Disk Structure

Create, view, and manage disks, directories, and files

- Types of partitions on a hard drive:
 - Primary partitions – usually first, can not subdivide, four per drive
 - Active partitions – used to boot the computer
 - Extended partitions – one per drive, subdivided into logical drives
- The Disk Management Utility is used to display information and perform services such as partitioning and formatting disks in Windows.
- The Disk Management utility displays the status of each disk including **Foreign, Healthy, Initializing, Missing, Not Initialized, Online, Online (Errors), Offline, Audio CD, or No Media.**

File Systems of Windows XP

- Partitions are formatted with a file system. Two file systems available in Windows XP:
 - FAT32
 - NTFS - greater stability and security features
- The type of file system, NTFS or FAT32, provides the rules that files within each directory must follow.

	FAT32	NTFS
Security	Low security	File and Folder Level permissions, encryption
Compatibility	Compatible with Windows 95/98/ME Can be read/written to by Linux and Mac OS users	Compatible with Windows NT/2000/ Vista) Read only for Linux/Unix
File Size	Limit of 4 GB files / 32 GB volumes	Limit of 16 Terabyte files/ 256 Terabyte volumes
Files Per Volume	4.17 million	4,29 billion
File Size Efficiency	Large clusters waste some space	Smaller clusters use more of the available space; built in compression maximises space
Reliability	Does not track changes made to the file system	Includes journaling which helps to rebuild the file system after a crash or power failure

System Tools

- Uses CHKDSK from within the GUI or command line to detect and repair disk errors.
- Disk Defragmenter makes files on the hard drive contiguous and speeds up the reading of files.
- System Information tool in Windows XP provides access to:
 - Net Diagnostics
 - System Restore
 - File Signature Verification Utility
 - DirectX Diagnostic Tool
 - Dr Watson

Virtual Memory

- Swap file uses free space on the hard drive to temporarily store segments of an application or data.
- The OS uses the swap file to mimic RAM.
- To adjust the size of the swap file, you must be logged in as an administrator.
- Typically, you should let Windows manage the size of the swap file.
- Increasing the size of the swap space is not always helpful and may slow down the computer.

Administrative Tools

Manage permissions and users or configure computer components and services.

- Most common administrative tools:
 - Event Viewer – Logs a history of events regarding applications, security, and the system.
 - Computer Management – Provides access to administrative areas such as System Tools, Storage, and Services and Applications.
 - Services – Manage all of the services on local and remote computers.
 - Performance Monitor – Displays and logs real-time information about the processors, disks, memory, and network usage for the computer.

Operating system performance optimization

- The Device Manager allows you to view all of the settings for devices in a computer such as the IRQ, I/O address, and the DMA settings. It can also be used to diagnose and resolve device conflicts.
- The Task Manager allows you to view information about applications that are currently running.
- The System Monitor is part of the Performance Console and displays real-time information about the processors, disks, memory, and network usage of the computer.

Optimize Web Browser and E-mail

- Web browsers and e-mail
 - Typically the most-used applications
 - Optimizing them should increase the computer's performance
- Microsoft's Internet Explorer (IE), general settings:
 - Change the homepage and browser appearance
- View or delete the information saved by the browser:
 - History
 - Temporary files
 - Cookies
 - Passwords
 - Web-form information

Configure E-mail Client Software

- Use the following information to set up an email account in the email client software:
 - Display name
 - E-mail address
 - Type of incoming mail server
(POP3 or IMAP)
 - Incoming mail server name
 - Outgoing mail server name
 - Username
 - Account password

Email Protocols

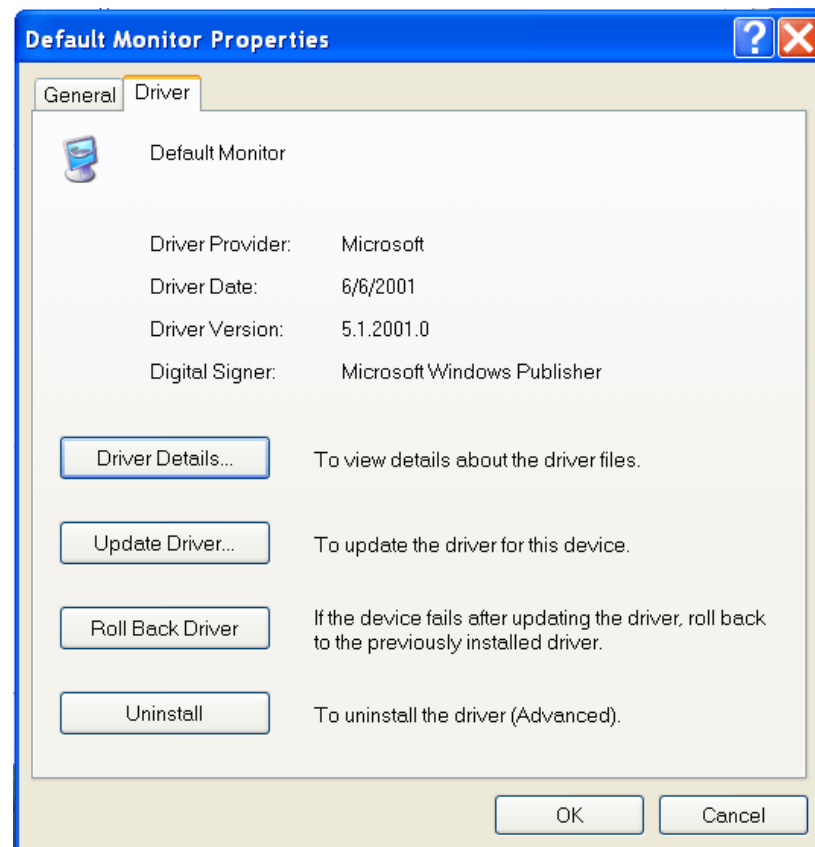
- Post Office Protocol version 3 (POP3)
 - Downloads email from a server to manipulate and store on local computer.
- Internet Message Access Protocol (IMAP)
 - Accesses email on a server to manipulate and store on the server.
 - User can also decide to download the email to local computer.
- Simple Mail Transfer Protocol (SMTP)
 - Sends text-only email across a TCP/IP network and is, normally, used with POP3 or IMAP.
- Multipurpose Internet Mail Extensions (MIME)
 - Transmits audio, video, pictures, word processor documents, applications.
 - Normally, used in conjunction with SMTP.

Set Display Properties

- Screen resolution
 - Determines the number of pixels displayed. A higher number of pixels will display a better picture.
- Refresh rate
 - The rate the screen image is refreshed. Refresh rates are measured in Hertz (Hz) or times per second.
- Display colors
 - Colors created by varying the light intensity of the three basic colors.

Upgrade the Video Driver

- The Windows default video driver may work, but may not provide all performance options.
- To upgrade the driver:
 1. Download most recent driver
 2. Remove the current driver
 3. Disable anti-virus software
 4. Install the new driver
 5. Enable anti-virus software
 6. Restart the computer



Dual-Boot Process

Installation of a second operating system

- There is a dual-boot process for multiple operating systems on a computer.
- During the dual-boot process:
 - The boot.ini file indicates that more than one OS is present.
 - You are prompted to choose the OS that you want to load.
- To create a dual-boot system in Microsoft Windows:
 - There is more than one hard drive or a hard drive with more than one partition.
 - Install the oldest OS on the primary partition or the hard drive marked with an active partition.
 - Install the second OS on the second partition or hard drive.
 - The boot files are automatically installed in the active partition.

Command Line Interface (CLI)

■ **MSCONFIG**

- Starts System Configuration Utility
- Used when the computer boots but will not load the Windows operating system correctly
- Performs diagnostic procedures on the Windows startup files

■ **sfc /scannow**

- System File Checker
- Check all of the protected system files: ex. `krnl386.exe`
- Replaces altered or corrupted files with known good versions

■ Other commands are explained in the curriculum

Upgrading Operating Systems

- Operating systems must be upgraded periodically.
 - To remain compatible with the latest hardware and software
 - Because support for older OS is eventually withdrawn
- A Windows XP upgrade can be performed from a CD or over a network.
- Ensure that the new OS is compatible with the computer.
 - Use Microsoft Upgrade Advisor to scan the system for incompatibility issues before upgrading. Upgrade Advisor is free and downloadable from the Microsoft Windows website.
- Backup all data prior to beginning the upgrade.

Schedule Automatic Tasks and Updates

- Use the Scheduled Tasks utility to automate:
 - Disk cleanup
 - Backup
 - Disk defragmenter
 - Starting other applications
- Use the **at** command to automatically schedule a command, a script file, or an application to run at a specific date and time.
- To use the **at** command, you must be logged in as a member of the Administrators group.

Automatically Update Windows XP

- Settings to choose from regarding Windows XP updates:
 - Automatic (need to specify a date and time)
 - Download updates for me, but let me choose when to install them
 - Notify me but don't automatically download or install them
 - Turn off Automatic Updates

Restore Points

- Restore points return the OS to a predefined point in time.
- If installation of an application or a hardware driver causes problems, try uninstalling the application or driver.
- If uninstalling does not help, try to restore the computer to an earlier time when the system worked properly.
- Windows XP may create restore points in the following scenarios:
 - When an install or upgrade takes place
 - Every 24 hours, if the computer is running
 - Manually, at any time

Troubleshooting Process

- Step 1** Identify the problem
- Step 2** Establish a theory of probable causes
- Step 3** Determine an exact cause
- Step 4** Implement a solution
- Step 5** Verify solution and full system functionality
- Step 6** Document findings

Step 1 - Identify the Problem

- **Hardware/Software Information**

- Manufacturer, model, OS, network environment, connection type

- **Open-Ended Questions**

- What operating system is installed on the computer?
 - What programs have been installed recently?
 - What updates or service packs have been installed?
 - What error messages have you received?
 - What were you doing when the problem was discovered?

- **Closed Ended Questions**

- Does anyone else have this problem?
 - Have you changed your password recently?
 - Have you made any changes to your computer?
 - Does anyone else have access to your computer?
 - Has this problem happened before?

Step 2 - Establish a Theory of Probable Causes

- The Problem may be simpler than the customer thinks.
- Create a list of the most common reasons why the error would occur.
 - Corrupted or missing system files
 - Incorrect device driver
 - Failed update or service pack installation
 - Corrupted registry
 - Failing of faulty hard drive
 - Incorrect password
 - Virus infection
 - Spyware

Step 3 - Determine the Exact Cause

- Testing your theories of probable causes one at a time, starting with the quickest and easiest.
 - Reboot the computer.
 - Run sfc/scannow.
 - Roll back or reinstall the device driver.
 - Uninstall recent updates or service packs.
 - Run system restore.
 - Run CHKDSK
 - Log in as a different user.
 - Boot to the last known good configuration.
 - Run a virus scan.
 - Run a spyware scan.
- If the exact cause of the problem has not been determined after you have tested all your theories, establish a new theory of probable causes and test it.

Step 4 - Implement a Solution

- Sometimes quick procedures can determine the exact cause of the problem or even correct the problem.
- 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.

Step 5 - Verify Solution and System Functionality

- Verifying full system functionality and implementing any preventive measures if needed. This ensures that you have not created another problem while repairing the computer.
 - Reboot the computer.
 - Access all drives and shared resources.
 - Check event logs to ensure there are no new warnings or errors.
 - Check Device Manager to ensure there are no warnings or errors.
 - Make sure applications run properly.
 - Make sure the Internet can be accessed.
 - Check Task Manager to ensure that there are no unidentified programs running.

- Have the customer verify the solution and system functionality.

Step 6 - Document Findings

- Discuss the solution with the customer
- Have the customer confirm that the problem has been solved
- Document the process
 - Problem description
 - Solution
 - Components used
 - Amount of time spent in solving the problem

Common Problems and Solutions

- Computer problems can be attributed to hardware, software, networks, or some combination of the three. You will resolve some types of computer problems more often than others.

Apply Troubleshooting Skills

- It is time to apply your listening and diagnostic skills.



Chapter 12 Summary

- Ensure that you fully understand the technology needs of the customer.
- Know the differences between common operating systems.
- Match the customer needs to the proper technologies.
- Know the different methods to install an operating system.
- Know how to upgrade different operating systems.
- Understand how preventive maintenance can stop problems before they start.
- Know which preventive maintenance procedures are appropriate for the customer.
- Know how to troubleshoot operating system problems.

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