

**INVER HILLS COMMUNITY COLLEGE
INVER GROVE HEIGHTS, MINNESOTA**

COURSE OUTLINE

COURSE NAME: PC Hardware and Software (A+)
COURSE NUMBER: CNT2300
CREDIT HOURS: 4 hours of lecture weekly
DEPARTMENT: Network and Computer Technology

CATALOG DESCRIPTION

CNT2300

PC Hardware and Software (A+)

4 credit hours – Four hours of lecture weekly; one term

Presents an in-depth exposure to computer hardware and operating systems. Students learn the functionality of hardware and software components as well as suggested best practices in maintenance and safety issues. Students learn how to assemble and configure a computer, install operating systems and software, and troubleshoot hardware and software problems. This course helps students prepare for Comp TIA's A+ certification exam, which covers the knowledge and skills essential for becoming a successful computer technician.

Prerequisites: None

LEARNING OBJECTIVES

Upon completion of this course, the student will be able to:

- a. Configure a system.
- b. Install and Upgrade a system.
- c. Diagnose a hardware or software problem.
- d. Repair a hardware or software problem.
- e. Perform preventive maintenance on a system.
- f. Demonstrate repair and testing procedures that conform to learned safety standards.

DIVISION OF SUBJECT MATTER

<u>Main Topic</u>	<u>Time Allocation</u>
1.0 Information Technology Basics	5%
2.0 How Computers Work	15%
3.0 Assembling a Computer	7%
4.0 Operating System Fundamentals	5%
5.0 Windows 9x Operating Systems	8%
6.0 Windows NT/2000 Operating Systems	8%
7.0 Windows XP Operating System	8%
8.0 Multimedia Capabilities	5%
9.0 Advanced Hardware Fundamentals for Servers	5%
10.0 Networking Fundamentals	8%
11.0 Printers and Printing	5%
12.0 Preventive Maintenance and Upgrading	5%
13.0 Troubleshooting PC Hardware	8%
14.0 Troubleshooting Software	8%

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DETAILED COURSE OUTLINE

- 1.0 Information Technology Basics
 - 1.1. Getting Started in IT
 - 1.1.1. Computer systems and programs
 - 1.1.2. Computer types
 - 1.1.3. Connecting computer systems
 - 1.1.4. Birth of the Internet
 - 1.1.5. The cost of technology
 - 1.2. Windows Desktop Environment
 - 1.2.1. Starting, shutting down, and restarting Microsoft Windows
 - 1.2.2. Windows Explorer
 - 1.2.3. The desktop
 - 1.2.4. Working with icons
 - 1.2.5. Recognizing an application window
 - 1.2.6. Resizing a desktop window
 - 1.2.7. Switching between windows
 - 1.3. Basic Features of Windows
 - 1.3.1. Viewing a computer's basic system information
 - 1.3.2. Setting the clock and date
 - 1.3.3. Minimizing, maximizing, and exiting
 - 1.3.4. Adjusting the screen display
 - 1.3.5. Desktop settings
 - 1.3.6. Adjusting audio volume
 - 1.3.7. Start menu options
 - 1.3.8. Recycle Bin
 - Lab: Getting to know Windows
 - Worksheet: Windows Navigation and Settings
 - 1.4. Overview of Software Applications
 - 1.4.1. Word processors
 - 1.4.2. Spreadsheets
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 - 1.4.3. Databases
 - 1.4.4. Graphics applications
 - 1.4.5. Presentation applications
 - 1.4.6. Web browser and e-mail
 - 1.5. Math for a Digital Age
 - 1.5.1. Measurement-related terminology
 - 1.5.2. Analog and digital systems
 - 1.5.3. Boolean logic gates
 - Lab: Boolean Operation
 - 1.5.4. Decimal and binary number systems
 - 1.5.5. Decimal to binary conversion
 - Interactive Lab: Decimal to Binary Conversion
 - Interactive Lab: Binary to Decimal Conversion
 - 1.5.6. The hexadecimal number system
 - 1.5.7. Binary to hexadecimal conversion
 - Interactive Lab: Binary to Hexadecimal Conversion
 - 1.5.8. Hexadecimal to binary conversion
 - 1.5.9. Converting to any base
 - Lab: Converting Numbers Overview
 - Worksheet: Number Systems Exercise

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- 1.6. Introduction to Algorithms
 - 1.6.1. Laboratory Safety and Tools
 - 1.6.2. Basic lab safety principles
 - 1.6.3. Workspace practices that help reduce ESD potential
 - 1.6.4. Tools of the trade
 - 1.6.5. Workspace cleaning supplies
 - 1.6.6. Workplace testing equipment
 - 1.6.7. Lab safety agreement
 - Worksheet: Lab Safety Checklist

Summary

- 2.0 How Computers Work
 - 2.1 System Overview
 - 2.1.1. Input, process, output, and storage
 - 2.2 Boot Process
 - 2.2.1. Initializing the system hardware
 - 2.2.2. Loading the operating system
 - 2.2.3. The boot sequence
 - 2.3 Hardware Components
 - 2.3.1. Computer case
 - PhotoZoom: PC
 - 2.3.2. Power Supply
 - PhotoZoom: Power Supply and Connectors
 - Worksheet: Power Supply
 - 2.3.3. Cooling Systems
 - 2.3.4. The motherboard
 - 2.3.5. Motherboard Form Factors
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 - 2.3.6. Motherboard components
 - PhotoZoom: Motherboard
 - Lab: Motherboard Identification
 - 2.3.7. The CPU
 - 2.3.8. BIOS
 - Lab: Identify ROM and BIOS Chips
 - Worksheet: BIOS/ROM
 - 2.3.9. Expansion slots
 - Lab: Identifying Computer Expansion Slots (R)
 - Worksheet: Expansion Slots (R)
 - 2.3.10. Riser Cards
 - 2.3.11. Bus types
 - 2.4 Memory Components
 - 2.4.1. RAM
 - 2.4.2. Identifying SIMMs and DIMMs
 - Lab: Identifying RAM and RAM Sockets (R)
 - Worksheet: RAM and RAM Sockets (R)
 - 2.4.3. Cache/COASt memory
 - 2.5 Display Components
 - 2.5.1. Monitors / Display Devices
 - PhotoZoom: Monitor
 - 2.5.2. Video cards
 - PhotoZoom: Video Card
 - Lab: Video Card Identification

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Worksheet: Video Card

2.6 Connector Components

- 2.6.1 Serial and Parallel Ports
- 2.6.2 PS/2 Ports/6-pin Mini Din, 5-Pin DIN
- 2.6.3 USB and Firewire
- 2.6.4 IDE, EIDE, Ultra, and SCSI controllers
- 2.6.5 SCSI Disk Types

2.7 Storage Components

- 2.7.1 Floppy Drive
 - PhotoZoom: Floppy Disk Drive
 - Worksheet: Floppy Drive
- 2.7.2 The hard drive
 - PhotoZoom: Hard Drive
 - Worksheet: Hard Drive Identification
- 2.7.3 CD-ROMs
 - PhotoZoom: CD-ROM Drive
 - Worksheet: CD-ROM Identification
- 2.7.4 DVD-DVDRW
- 2.7.5 Backup Hardware

2.8 Network Components

- 2.8.1 Modems
- 2.8.2 Network interface cards (NICs)
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2.9 System Resources

- 2.9.1 What are system resources?
- 2.9.2 Interrupt requests (IRQs)
- 2.9.3 Direct memory access (DMA)
- 2.9.4 Input/output (I/O) addresses

2.10 Portable Devices

- 2.10.1 Notebook Computers
- 2.10.2 Portable Hardware
- 2.10.3 PCMCIA Cards
- 2.10.4 Portable Computer displays
- 2.10.5 Docking station – port replicators
- 2.10.6 Upgrading and Troubleshooting Notebooks
- 2.10.7 Infrared Devices
- 2.10.8 Wireless Access Points

Summary

3.0 Assembling A Computer

3.1 Overview of The Assembly Process and Safety Issues

- 3.1.1 Overview of general safety issues
- 3.1.2 ESD precautions
- 3.1.3 Process demonstration
 - Video: Assembling a Computer

3.2 Creating a Computer Inventory

- 3.2.1 Importance of an inventory
- 3.2.2 Inventory checklist

3.3 The Computer Case and Power Supply

- 3.3.1 Computer cases and system units
- 3.3.2 Desktops
- 3.3.3 Towers

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- 3.3.4 Power supplies
 - Lab: The Computer Case and Power Supply
 - Worksheet: Power Supplies
- 3.4 Preparing The Motherboard for Installation
 - 3.4.1 Motherboard location map
 - 3.4.2 Motherboard configuration
 - 3.4.3 Motherboard jumpers
 - 3.4.4 Installing the CPU
 - 3.4.5 Installing the heat sink and fan
 - 3.4.6 Installing RAM
- 3.5 Installing The Motherboard
 - 3.5.1 Installing the motherboard into the case
 - 3.5.2 Attaching the LEDs, keylock, and speaker
 - 3.5.3 Connecting power supply cables to the motherboard
 - Lab: Motherboard Installation
 - 3.5.4 Installing The Floppy Drive, Hard Drive, CD-ROM, DVD
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 - 3.5.5 Attaching the floppy drive to the case
 - 3.5.6 Attaching the hard drive and CD-ROM to the case
 - 3.5.7 Connecting the floppy drive, hard drive, CD-ROM and DVD to the system
 - 3.5.8 Connecting power cables to the floppy drive, hard drive, and CD-ROM
 - Lab: Floppy Drive, Hard Drive, and CD/DVD-ROM Installation
 - Video: Installing the Floppy Drive, Hard Drive, and CD-ROM Drive
- 3.6 Video Card Installation
 - 3.6.1 Step-by-step installation of the video card
 - Lab: Video Card Installation and System Booting
 - Video: Installing a Video Card
- 3.7 Final Steps
 - 3.7.1 Fitting the case together
 - 3.7.2 Connecting the keyboard, mouse, monitor, and power cord
- 3.8 Booting The System for The First Time
 - 3.8.1 What is BIOS?
 - Worksheet: What is BIOS
 - 3.8.2 Entering the BIOS configuration
 - 3.8.3 Standard CMOS setup screen
 - 3.8.4 BIOS features and chipset features setup screens
 - 3.8.5 Power management and plug and play screens
 - 3.8.6 Integrated peripherals and fixed disk detection screens
 - 3.8.7 Password screens and the load setup defaults screen
 - 3.8.8 BIOS exit options
 - 3.8.9 Startup sequence

Summary

4.0 Operating System Fundamentals

4.1 The Operating System

- 4.1.1 Components of an operating system
- 4.1.2 Operating system functions
- 4.1.3 Operating system types and basic terminology
 - Worksheet: Operating System Fundamentals

4.2 Disk Operating System (DOS)

- 4.2.1 What is DOS, and why learn about it?
- 4.2.2 DOS file structure

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- 4.2.3 Overview of basic DOS commands
Lab: Basic DOS Commands
Worksheet: DOS Commands
- 4.2.4 Creating a DOS boot disk
Lab: Creating a DOS Boot Disk
- 4.2.5 Booting the system with a DOS disk
- 4.2.6 DOS configuration files
- 4.2.7 Editing system configuration files
Worksheet: DOS
- 4.3 Memory Management
 - 4.3.1 Memory types
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 - 4.3.2 Memory management tools
 - 4.3.3 Other types of memory
 - 4.3.4 Memory conflicts
 - 4.3.5 Real versus Protected mode memory addressing
- Summary
- 5.0 Windows 9x Operating Systems
 - 5.1 The Windows 9x File Structure and File Management System
 - 5.1.1 Naming files in Windows
 - 5.1.2 Directories and folders
 - 5.1.3 Using a text editing application to create a file (document)
 - 5.1.4 Copy, cut, or create shortcuts
 - 5.1.5 Viewing document details
 - 5.1.6 Recognizing file types in Windows
Lab: Change File Views in Windows (showing file extensions)
 - 5.1.7 Selecting, copying, and moving files
Lab: Text Editing and File Management
 - 5.1.8 Searching for a file, folder, or directory
 - 5.1.9 Make backup copies of files onto a diskette
 - 5.1.10 Using the Recycle Bin
Worksheet: Windows Files and Folders
 - 5.2 Windows Management with Control Panel
 - 5.2.1 System applet
 - 5.2.2 Printer
Worksheet: Managing Printers
 - 5.2.3 Add/Remove Programs
 - 5.2.4 Add/Remove Hardware
 - 5.2.5 Display and Sounds
 - 5.3 System Tools
 - 5.3.1 The Registry
 - 5.3.2 REGEDIT and SCANREG
 - 5.3.3 MSCONFIG, Startup Menu, and Safe Mode
 - 5.3.4 WSCRIPT.EXE, HWINFO.EXE, and ASD.EXE
 - 5.4 Preparing a Hard Drive for Operating System Installation
 - 5.4.1 Partitioning a hard drive
 - 5.4.2 Formatting a hard drive
Lab: Hard Drive Preparation Using FDISK and FORMAT
Worksheet: Preparing the Hard Drive
 - 5.5 Installing Windows 9x
 - 5.5.1 Windows 9x versions overview

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- 5.5.2 Requirements for installing Windows 98
- 5.5.3 Understanding the steps in Windows 98 installation
- 5.5.4 Windows 98 setup options
- 5.5.5 Upgrade installation
Lab: Windows OS Installation

5.6 Troubleshooting the Installation Process
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- 5.6.1 Systematic troubleshooting techniques and finding help
Lab: Troubleshooting 101
- 5.6.2 Windows 98 setup errors
- 5.6.3 System properties and identifying icon symbols
- 5.6.4 Adding software drivers
Lab: Installing a Driver
- 5.6.5 Making a backup Windows startup disk
Lab: Create a Startup Disk
- 5.6.6 Uninstalling Windows 98
Worksheet: Troubleshooting Windows Installation

Summary

6.0 Windows NT/2000 Operating Systems

6.1 Windows 9x Contrasts

- 6.1.1 NTFS versus FAT
- 6.1.2 Security and permissions
- 6.1.3 Windows 2000 boot process
- 6.1.4 Plus-and-Play drivers

6.2 System Tools

- 6.2.1 Administrative tools
Lab: Creating Users Accounts in Windows 2000
Lab: Assigning Permissions in Windows 2000
- 6.2.2 Windows 2000 registry
- 6.2.3 Startup Menu and Safe Mode
- 6.2.4 The ERD and Recovery Console for Windows 2000
Lab: Creating an Emergency Repair Disk in Windows 2000

6.3 Overview of the Installation Process

- 6.3.1 Differences between Windows 2000 and 9x installation
- 6.3.2 Hardware requirements
- 6.3.3 Windows 2000 features

6.4 Installing the Windows 2000 OS

- 6.4.1 Requirements for installing Windows 2000
- 6.4.2 Understanding the steps in Windows 2000 installation
- 6.4.3 Windows 2000 setup options
Lab: Installation Demonstration of Windows 2000

6.5 Special Installations

- 6.5.1 Upgrading from Windows NT Workstation 4 to Windows 2000
- 6.5.2 Replacing Windows 9x with Windows 2000
- 6.5.3 Dual boot Windows 9x with Windows 2000

Summary

7.0 Windows XP Operating System

7.1 Windows XP Versions

- 7.1.1 Windows XP Home Edition
- 7.1.2 Windows XP Professional

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- 7.1.3 Windows XP Professional 64-bit
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- 7.1.4 Windows XP Media Center Edition
- 7.2 Overview of the Installation Process
 - 7.2.1 Differences between Windows 2000/9x installation and XP
 - 7.2.2 Windows XP Hardware requirements
 - 7.2.3 Windows XP features
- 7.3 Installing the Windows XP OS
 - 7.3.1 Requirements for installing Windows XP
 - 7.3.2 Understanding the steps in Windows XP installation
Lab: Installation Demonstration of Windows XP
 - 7.3.3 Windows XP setup options
- 7.4 Special Instructions
 - 7.4.1 Upgrading Windows NT Workstation 4/2000 to XP
Lab: Using the Scandisk and Defrag Utilities
 - 7.4.2 Upgrading Windows 98 to Windows XP Professional
 - 7.4.3 Dual boot Windows 9x, Windows NT 4, Windows 2000, and Windows XP
- 7.5 Windows XP and Windows NP/2000/ME/9x Contrasts
 - 7.5.1 Keeping user files private
 - 7.5.2 Simple file sharing versus Windows 2000 sharing
Lab: Using Simple File Sharing to Share Files
 - 7.5.3 Internet enhancements
Lab: Remote Desktop Connection
Lab: Internet Connection Firewall
 - 7.5.4 System properties
 - 7.5.5 Graphical User Interface (GUI)
Lab: Using the Windows XP Start Menu and Windows Explorer

Summary

8.0 Multimedia Capabilities

- 8.1 Introduction to Multimedia
 - 8.1.1 Basic hardware required for multimedia upgrades
 - 8.1.2 The video adaptor
 - 8.1.3 Characterizing computer displays
 - 8.1.4 Sound cards and speaker systems
 - 8.1.5 Common media file formats used in multimedia applications
 - 8.1.6 MPEG hardware versus software
Worksheet: Multimedia Devices
- 8.2 Upgrading Video with a Video Acceleration Board
 - 8.2.1 PCI and AGP types
 - 8.2.2 All in one
 - 8.2.3 Installing and configuring the video card driver and software
Lab: Upgrading the Video Accelerator
 - 8.2.4 Understanding RAMDAC and video memory
 - 8.2.5 Flashing the video board with BIOS updates
Worksheet: Video Accelerators
- 8.3 Adding Audio Capabilities with a Sound Card
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 - 8.3.1 Sound card operation
 - 8.3.2 USB, PCI, and built-in sound
 - 8.3.3 Removing or disabling outdated sound cards

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- Worksheet: Sound Cards
 - 8.3.4 Physical installation of sound cards
 - Lab: Sound Card Installation
 - 8.3.5 Connecting the CD-ROM or DVD player to the sounds card
 - 8.3.6 Sound card driver and software installation
 - 8.3.7 MIDI and external-audio source connection
 - 8.4 Overview of CD-RW and DVD
 - 8.4.1 Drive
 - 8.4.2 Recording CDs with CD-R and CD-RW
 - 8.4.3 Digital extraction explained
 - 8.4.4 DVD drives
 - 8.4.5 Recordable DVD
 - 8.4.6 CD recording formats
 - 8.4.7 DVD layering and formats
 - Worksheet: CD and DVD Terminology
 - 8.5 Digitizing Video
 - 8.5.1 Digital cameras and video cameras
 - 8.5.2 Hardware and software video capture
 - 8.5.3 Installing and configuring a video capture board
 - Summary
- 9.0 Advanced Hardware Fundamentals for Servers
- 9.1 Network Server Overview
 - 9.1.1 Network server
 - 9.1.2 RAID
 - Lab: Basic Disk to Dynamic Disk Conversion
 - 9.1.3 RAID controller
 - 9.1.4 Hardware RAID versus software RAID
 - Worksheet: RAID
 - 9.2 Hardware-Based RAID Configuration
 - 9.2.1 Hardware-based RAID configuration overview
 - 9.2.2 RAID 0 configuration
 - 9.2.3 RAID 1 configuration
 - 9.2.4 RAID 5 configuration
 - 9.2.5 RAID 0/1 configuration
 - 9.3 Configuring External Peripherals
 - 9.3.1 Overview of external disk subsystems
 - 9.3.2 Configuring an external disk subsystem
 - 9.3.3 Configuring an external CD-ROM system
 - 9.4 Adding Hardware to a Server
 - 9.4.1 Replacing a single processor with a faster processor
 - 9.4.2 Installing additional processors
 - 9.4.3 Upgrading the operating system for multiple processors
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 - Worksheet: Adding Processors
 - 9.4.4 Adding hard drives
 - 9.4.5 Adding memory
 - 9.5 Upgrading Server Components
 - 9.5.1 Upgrading adapter memory
 - 9.5.2 Upgrading adapter BIOS or firmware
 - 9.5.3 Replacing an adapter
 - 9.5.4 Upgrading peripheral devices

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- 9.5.5 Upgrading system monitoring agents
- 9.5.6 Upgrading service tools
- 9.5.7 Document the configuration

Summary

10.0 Networking Fundamentals

10.1 Introduction to PC Networking

- 10.1.1 Defining a computer network
- 10.1.2 File, print, and application services
- 10.1.3 Mail services
- 10.1.4 Directory and name services
- 10.1.5 The Internet
- 10.1.6 Network administration
- 10.1.7 Simplex, half-duplex, and full-duplex transmission

10.2 Types of Networks

- 10.2.1 Overview
 - 10.2.2 Peer-to-peer networks
 - 10.2.3 Client/server networks
 - 10.2.4 Local-area networks (LANs)
 - 10.2.5 Wide-area networks (WANs)
- Worksheet: Types of Networks

10.3 Adding a Network Interface Card (NIC)

- 10.3.1 What is a NIC?
Lab: NIC Installation
- 10.3.2 Setting the IP address
- 10.3.3 DHCP servers
Lab: Configuring the NIC to Work with a DHCP Server
- 10.3.4 Default gateway
- 10.3.5 Domain Name System

10.4 Physical Components of a Network

- 10.4.1 Network topologies
- 10.4.2 Physical versus logical topology
Worksheet: Network Topology
- 10.4.3 Networking media
- 10.4.4 Common networking devices
- 10.4.5 Server components

10.5 LAN Architectures

- 10.5.1 Ethernet
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- 10.5.2 Token Ring
- 10.5.3 Fiber Distributed Data Interface (FDDI)

10.6 Networking Protocols and the OSI Model

- 10.6.1 OSI model overview
- 10.6.2 What is a protocol?
- 10.6.3 Transmission Control Protocol/Internet Protocol
- 10.6.4 Internetwork Packet Exchange/Sequenced Packet
- 10.6.5 NetBEUI
Worksheet: OSI Model, TCP/IP, Protocols
- 10.6.6 Apple Talk

10.7 TCP/IP Utilities

- 10.7.1 Overview
- 10.7.2 Ping

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Lab: Troubleshooting a NIC Using the Ping Command

10.7.3 ARP, RARP, and NSLOOKUP

10.7.4 Netstat and tpcon

10.7.5 Nbtstat

10.7.6 Ipconfig, iptrace, and traceroute

10.8 Connecting to the Internet

10.8.1 Synchronous and asynchronous serial lines

10.8.2 Modems

10.8.3 Dial-up networking, modem standards, and AT commands

10.8.4 ISPs and Internet backbone providers

10.8.5 Digital subscriber line (DSL)

10.8.6 Cable modems

10.8.7 Cable modem versus DSL Internet technologies

Worksheet: Connecting to the Internet

10.8.8 ISDN

10.8.9 Satellite Internet

Summary

11.0 Printers and Printing

11.1 Understanding Printers and Printing

11.1.1 Printer overview

11.1.2 Understanding dot matrix printer operation

11.1.3 Understanding laser printer operation

11.2 Buying a Printer

11.2.1 Print capacity and speed

11.2.2 Printer quality and resolution

11.2.3 Reliability

11.2.4 Cost of ownership

11.2.5 Laser versus Inkjet printers

11.3 Connecting a Printer

11.3.1 Serial, parallel, USB, SCSI, and network communication types

11.3.2 Page description languages

11.3.3 Installing and updating printer drivers

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11.3.4 Ink and toner installation and adjustment

11.3.5 Print media installation and adjustment

11.3.6 Installing additional printer memory

11.3.7 Adding a local printer in Windows 2000

Lab: Adding an Inkjet Printer to a Computer

11.3.8 Printing a test page

11.4 Sharing a Printer

11.4.1 Host-based printing technology

11.4.2 Printer switches

11.4.3 Printer built-in fonts and font cards

11.4.4 Configuring printer sharing

Lab: Setting Up Print Sharing Capabilities

11.4.5 Adding a network printer

11.4.6 Installing print services

11.4.7 The network print server

11.4.8 Printer network interface cards (NICs)

11.5 Managing a Printer

11.5.1 Using the printer queue to manage print jobs

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- 11.5.2 Setting print times for large or less important documents
- 11.5.3 Selecting a default printer
- 11.5.4 Configuring individual printer options
Lab: Managing Files in a Printer Queue
- 11.5.5 Printer accessories
- 11.6 Dealing with Paper Problems
 - 11.6.1 Obstructions in the paper path
Worksheet: Paper Jams
 - 11.6.2 Stripped and broken drive gears
 - 11.6.3 Stepper motor problems
 - 11.6.4 Defective registration roller and other feed rollers
 - 11.6.5 Wrong type of paper
 - 11.6.6 High humidity
 - 11.6.7 Paper dusting

Summary

12.0 Preventive Maintenance and Upgrading

- 12.1 Preventive Maintenance and the Technician
 - 12.1.1 Elements of a preventive maintenance program
 - 12.1.2 Tools and equipment
Lab: Using a Digital Multimeter
 - 12.1.3 Environmental guidelines
 - 12.1.4 Environmental guidelines for a server room
Worksheet: Environmental Considerations
 - 12.1.5 Proper disposal of hazardous materials
 - 12.1.6 Using Material Safety and Data Sheets (MSDS)
- 12.2 Preventive Maintenance and Electrostatic Discharge (ESD)
 - 12.2.1 Electrostatic discharge (ESD) overview
Worksheet: Electrostatic Discharge (ESD)
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 - 12.2.2 Antistatic bags
 - 12.2.3 Grounding wrist straps
 - 12.2.4 Compressed air
 - 12.2.5 Grounded workbench
- 12.3 Preventive Maintenance for Computer Peripherals
 - 12.3.1 Monitor
 - 12.3.2 Mice
 - 12.3.3 Keyboard
 - 12.3.4 Cleaning printers
 - 12.3.5 Scanners
Lab: Cleaning Computer Components
Worksheet: Preventive Maintenance for Components
- 12.4 Preventive Maintenance for Computer Software
 - 12.4.1 Software utilities
Lab: Using the Scandisk and Defrag Utilities
 - 12.4.2 User responsibilities
 - 12.4.3 Anti-virus
 - 12.4.4 Firewall
 - 12.4.5 Power issues
 - 12.4.6 Surge suppressor and power supplies
 - 12.4.7 UPS in a server environment

Summary

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13.0 Troubleshooting PC Hardware

13.1 Troubleshooting Basics

- 13.1.1 What is troubleshooting?
- 13.1.2 Identify the problem
Worksheet: Troubleshooting Basics
- 13.1.3 Gathering information
- 13.1.4 Developing a solution
- 13.1.5 Implementing the solution
- 13.1.6 Is the problem solved?
- 13.1.7 Documenting the solution
Lab: The Steps of the Troubleshooting Process
- 13.1.8 Troubleshooting tools
- 13.1.9 Diagnostic software
- 13.1.10 Disposal actions

13.2 Troubleshooting The Hardware Box

- 13.2.1 Overview of field replaceable units (FRUs)
- 13.2.2 POST errors
- 13.2.3 CMOS/BIOS errors
Lab: Identifying POST Errors
- 13.2.4 Motherboard-related errors
- 13.2.5 CPUs
- 13.2.6 RAM
- 13.2.7 Cable issues
- 13.2.8 Ports
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- 13.2.10 Secondary storage devices
- 13.2.11 Sound cards
- 13.2.12 Power supply issues
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13.3 Troubleshooting Peripheral Devices

- 13.3.1 Input devices
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- 13.3.3 SCSI interface issues
- 13.3.4 Internet/network access devices
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Summary

14.0 Troubleshooting Software

14.1 Role of the end user

- 14.1.1 Overview of the troubleshooting process
- 14.1.2 Eliciting information from the end user regarding the problem
- 14.1.3 Reproducing the error symptoms
- 14.1.4 Identify recent user changes to the software environment
- 14.1.5 Determining whether the problem is hardware or software related
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- 14.12 Windows-Specific Networking Software Connection Troubleshooting
 - 14.12.1 Error messages
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- 14.12.3 Incorrect protocols or protocol properties
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TEXTBOOKS

TITLE: IT Essentials I: PC Hardware and Software Companion Guide (Cisco Networking Academy Program), 2nd Edition
AUTHOR: ABC, Inc., Cisco Systems, Inc.
PUBLISHER: Cisco Press
ISBN: 1587131366

TITLE: HP IT Essentials I: PC Hardware and Software Lab Companion (Cisco Networking Academy Program), 2nd Edition
AUTHOR: ABC, Inc., Cisco Systems, Inc.
PUBLISHER: Cisco Press
ISBN: 1587131382