Chapter 22 - Supporting Printers

- Objectives
  - Learn about printer types and features
  - Learn how to install printers and how to share a printer over a local area network
  - Learn how to manage print jobs in Windows and how to install printer consumables
  - Learn about routine maintenance tasks necessary to support printers
  - Learn how to troubleshoot printer problems
- Printer Types and Features
  - Configure, repair, maintain printers
    - Requires knowledge of printer types and features
  - Understanding how a printer works
    - Helps in fixing printer problems
- Types of Printers
  - Major categories:
    - Laser, inkjet (ink dispersion), solid ink, dye sublimation, thermal printers, and impact printers
  - Laser printer: electrophotographic printer
    - Uses mechanical, electrical, and optical technologies
- Types of Printers (cont’d.)
  - Electrophotography overview
    - Toner placed on electrically charged rotating drum
    - Toner deposited on paper moving at drum speed
  - Six steps in laser printing:
    - Cleaning: drum cleaned of residual toner and charge
    - Conditioning: drum surface charged to -600 V
    - Writing: laser beam writes -100 V image to drum surface
    - Developing: toner applied to -100 V areas of the drum
    - Transferring: toner drawn off drum and onto paper
    - Fusing: heat and pressure fuse toner to paper
  - First four laser printing steps undergo the most wear
    - Reduce costs by performing steps in removable cartridges
  - Color laser printing
    - Writing process repeated four times
  - Overview of inkjet printer technology
    - Print head moves across paper
      - One line of text created with each pass
      - Ink applied to paper using matrix of small dots
    - Plates with magnetic charge direct path to the page
  - Comparing inkjet to laser printers:
    - Lower resolution
    - Images smudge on inexpensive paper
    - Usually cost less
  - Inkjet printer buying advice:
    - Printer using two or four separate cartridges
  - Overview of impact printer technology
    - Dot matrix printer
– A print head moves across width of the paper
– Pins is used to print matrix of dots on the page
  • Pins shoot against a cloth ribbon
  • Ribbon impacts paper and deposits ink
• Dot matrix printer technology advantages:
  – Continuous tractor feed allows event and data logging
  – Can use carbon paper: print multiple copies
  – Extremely durable
• Guidelines for maintaining print heads:
  – Keep the printer in a cool, well-ventilated area
  – Do not print over 50 to 75 pages without a cool down
• Overview of thermal printer technology
  – Use heat to produce output
  – Wax-based ink heated by heat pins
  – Heat pins melt ink onto paper
• Overview of dye-sublimation printer technology
  – Print head passes over and heats each color film
  – Heated film causes dye to vaporize onto glossy paper
• Overview of solid ink printer technology
  – Ink in solid blocks (color sticks) melted into print head
  – Head jets ink onto paper as it passes by on a drum
• Printer Features
• Printer options
  – Extra paper trays, special paper feeders or transparency feeders, staplers, collators, sorters
  – Duplexing: printing on both sides
• Printer rating characteristics
  – Warm-up time (time to print first page)
  – Resolution (measured in dpi or dots per inch)
  – Maximum duty cycle (monthly quota set by warranty)
  – Printing speed (measured in pages per minute)
  – Technology for formatting a page
• Combination fax machines, copiers, and scanners
• Powering a printer
  – AC power, AC adapter converting power to DC, or battery
• Local printer: connects directly to a computer
  – USB port, parallel port, serial port, wireless connection, IEEE 1394 port, SCSI port, PC Card, ExpressCard connection
• Network printer: uses Ethernet port
  – Connects using switch, hub, router port, or Wi-Fi
• Installing and Sharing Printers
• Installing a printer
  – Local printer attached to a PC using a port
  – Network printer connects directly with its NIC
  – Print server controls several network printers
• OS compatible print drivers required
• How to Install a Printer Using Vista
  • Ways to install a local USB printer
    – Plug in USB printer: Vista installs printer automatically
    – Launch the installation program
  • Installing a non-USB local printer or network printer
    – Verify printer on and available
    – Open the Printers window
    – Click Add a printer and select the type of printer
    – Vista searches printers
      • Select from list or point to the port or IP address
    – Change the name of the printer and test
• How to Install a Local Printer Using Windows XP
  • Installation begins differently depending on port
    – FireWire, USB, PC Card, ExpressCard, wireless
      • Software installation or printer connection order vary
      • Review printer documentation
  • Generals steps
    – Run setup program as an administrator
    – Connect the printer to the port when instructed
    – Close New Hardware Found Wizard
    – Make selection for default printer
    – Test the printer
• Installing a local printer using an older port
  – SCSI, serial, parallel port: not hot-pluggable
  • Generals steps
    – Plug printer into the port, turn on the printer
    – If installing drivers from manufacturer’s program:
      • Launch printer setup program, followed directions
    – If using the Windows installation process:
      • Open Printers and Faxes window, click Add a printer
      • Follow Add Printer Wizard directions
      • Print a test page
• Steps To Install a Network Printer Using Windows XP
  • Follow manufacturer directions
  • General steps
    – Open XP Printers and Faxes window
      • Start the wizard to add a new printer
      • Select option to install a local printer
      • Do not ask Windows to automatically detect printer
    – Choose Create a new port
      • Select Standard TCP/IP Port, Click Next twice
    – Identify the printer on the network
    – Click Have Disk
• Manage Printer Features and Settings
  • Printer Properties box
    – Configure add-on devices and set printer preferences
    – Useful option: print a test page
  • Manage printer features and hardware devices
    – Click the Device Settings tab
      • Manage duplex printing and paper sizes
• Install physical device
  – Examples: input trays and feeders, staplers, sorters, stackers, binders, output trays to sort output by user
  – Enable new equipment
  – Users need to know how to use new features
  – Share an Installed Printer
• Vista: Printer sharing must be turned on
• XP: File and Printer Sharing must be installed
• Remote PC requires Client for Microsoft Networks
  – Verify computer set to wake on LAN
• General steps for Vista or XP
  – Open Properties dialog box, select Sharing
  – Select share this printer, enter name for the printer
  – Make drivers available in Additional Drivers window
    • 32-bit operating systems: select x86
    • 64-bit operating systems: select x64
• How to Use a Shared Printer
• Remote PC must have network printer drivers
  – Can be installed from setup CD, windows, host PC
• Installing a shared printer on a remote computer
  – Use Vista Printer window or XP Printers and Faxes window
  – Use Network or My Network Places window
• Supporting Printers
• Extending printer working life
  – Follow manufacturer’s directions for device use
  – Perform necessary routine maintenance
• Maintenance topics:
  – Communication protocols used by printers
  – Managing printers
  – Perform routine tasks needed to maintain a printer
• Printer Languages
• Communication methods between OS and printer
  – Printer uses PostScript commands to build the page
  – Printer uses PCL commands to build the page
    • PCL: Printer Control Language
  – Windows GDI builds page, then sends it to the printer
    • GDI: Graphics Device Interface
  – Windows Vista uses XML Paper Specification (XPS) to build the page, then sends it to the printer
• XPS (XML Paper Specification)
  – Raw data printed with little-to-no formatting
• Using Windows to Manage Printers
• Spooling (simultaneous peripheral operations online)
  – Process of queuing print requests from application
  – Print spool: print queue
• Use Vista Printers window or XP Printers and Faxes window
  – Delete printers, change Windows default printer, empty printer queue, perform printer maintenance
• At printer installation
  – Default settings for user accounts applied
• Printer Consumables
• Printer manufacturers user manual
  – Defines consumables and exchange procedures
• Protection when working inside a printer
  – Turn printer off, unplug it, wait about 30 minutes
  – Never look at laser beam
  – Use an antistatic ground bracelet
  – Have help nearby
• Keep full supply on hand: paper, ink ribbons, color sticks, toner cartridges, ink cartridges
  – Know how to exchange and how to recognize when they need exchanging
• Maintaining Printers
• Printer maintenance procedures
  – Vary widely from manufacturer to manufacturer
• Sources of specific maintenance procedures
  – Printer documentation
  – Manufacturer’s Web site
• Printer Maintenance Kits
• Printer maintenance kit
  – Specific printer components
  – Step-by-step instructions for performing maintenance
  – Special tools or equipment: utilities and printer buttons
• Examples of replacing printer consumables
  – Replacing a toner cartridge
  – Replacing an image drum
  – Replacing a fuser
• Upgrade the Printer Memory or Hard Drive
• Internal hard drives hold print jobs and fonts
• Extra memory speeds up memory performance, reduces print errors, prevents Out of Memory errors
• Installation:
  – Use a screwdriver to remove printer cover plate
  – Remove thumb screws on the back of the printer, pull out the formatter board
    • Memory modules and hard installed on this board
    • Hard drive embedded on proprietary board that fits in the bay
    • Enable and configure using printer properties window
• Cleaning a Printer
• Routine printer maintenance
  – Clean outside of the printer with a damp cloth
  – Do not use ammonia-based cleaners
  – Clean the inside of the printer with a dry cloth
  – Do not blow out toner with compressed air
  – Two safe tools:
    • Toner-certified vacuum cleaner
    • Extension magnet brush
  – Software may be used to clean inkjet nozzles and align cartridges
    • Cartridge nozzles may have to be manually cleaned
• Online Support for Printers
• Printer manufacturer’s Web site
  – Online documentation
  – Knowledge base of common problems
    • Explanation of what to do about them
  – Updated device drivers
  – Catalog of options and upgrades for purchase
  – Replacement parts
  – Printer maintenance kits
  – Additional software
  – Firmware updates
• Updating Printer Firmware
• Replace printer’s DIMM containing the firmware
  – Download the update from manufacturer’s Web site
• Updating firmware (HP 8100 DN network printer)
  – Manual shows how to access firmware utility
    • Enter printer’s IP address in browser address box
  – Click Administration, then click Configuration tab
  – Check for firmware upgrades
    • Click the Support tab
    • Connect to the HP Web site
    • Search for updates and the download the software
• Troubleshooting Printers
• Section topics:
  – General printer troubleshooting
  – Troubleshooting specific problems
• General tasks performed during troubleshooting
  – Interview the user
  – Find out what works and does not work
  – Make an initial determination of the problem
  – When the problem is solved, check with the client
  – Document problem symptoms and solutions
• Printer Does Not Print
• Organize diagnostic questions in a flowchart
• Isolate problem to one of the following areas:
• The printer itself
  – Connectivity between the PC and its local printer
  – Connectivity between the PC and a network printer
  – OS and printer drivers
  – Application attempting to use the printer
• Problems with the printer itself
  – Verify that the printer is on
    • Print a self-test page
    • Review test page for clues
  – Test page not printing
    • Troubleshoot the printer until it prints correctly: paper issues, cover issues, cartridges installed, power source issues, reset the printer, check documentation
  – Test page will not print at all
    • Take printer to a certified repair shop
• Some tasks for fixing a problem with a cable or port
  – Verify cable firmly connected at both ends
  – Try a different cable, use a shorter cable
  – Use same cable with different PC
  – Use Device Manager, BIOS setup, port tester
• Problems with connectivity for a network printer
  – Verify printer is online, power cycle printer, reboot PC
  – Verify correct default printer selected
  – Delete and reinstall printer
  – Verify configuration, ping the printer, run diagnostics
  – Research error codes, flash firmware
• Problems with connectivity for a shared printer
  – Print a test page from local computer
  – Verify correct default printer selected and online
  – At remote computer, verify access to the computer to which printer attached
  – Delete printer and reinstall
  – Print to another shared printer
  – Verify hard drive space
• Problems printing from Windows
  – Delete all print jobs in the printer’s queue
  – Verify correct default printer selected and online
    • Verify printer properties; e.g., lower resolution
    • Reboot the PC, verify cable connections
    • Delete printer and reinstall, look for updated driver
  – Check Event Viewer for recorded events
  – Verify printer properties, try lower resolution
  – Disable print spooling, verify disk space, check for errors
  – Print from Safe Mode
• Problems printing from applications
  – Verify correct printer
  – Printing different file within same application
– Delete spool files, cancel print jobs using controls at the printer, power cycle printer
– Print text from Notepad
– Reopen application, create new data file, print
– Print from another application
– Add more memory to printer
– Reinstall printer drivers

• Problems with Laser Printers
  • Poor print quality or toner low message displayed
    – Unplug a heated printer, allow it to cool
    – Rock or replace toner cartridge
    – Verify EconoMode is off, check paper
    – Clean the printer
  • Printer stays in warm-up mode
    – Turn off printer, disconnect cable, turn on printer
    – Verify cable is connected to correct port
    – Verify data id being sent to the correct port
    – Reboot PC, print from another PC, check the network
  • A paper jam occurs or paper out message appears
    – Check for jammed paper in input tray and output bin
    – Check tray for problems
    – Check dampness of paper
  • One or more white streaks appear in the print
    – Remove toner cartridge, shake it, reinstall
    – Remove and clean the developer unit
  • Print appears speckled
    – Replace the cartridge
    – Replace the laser drum
  • Printed images are distorted
    – Check for debris, inspect drum for wear
  • Ghosted images print
    – Check image drum or toner cartridge
    – Clean the drum with a utility if possible
    – Replace the less expensive toner cartridge
  • Garbage printouts
    – Try using binary (bitmap) printing
  • A portion of the page does not print
    – Add more memory
    – Print only simple pages with few graphics
  • Printing is slow
    – Clean up the drive, install new drive, lower the resolution, add more printer or CPU memory
  • Printer makes a strange noise
    – Verify printer sitting level or stable
    – Check for loose or broken parts and that the cover is fully closed
  • Error codes appear in printer control panel window
    – Read documentation to resolve problem
Problems with Inkjet Printers

- Print quality is poor
  - Reinstall cartridge, check ink, clean nozzles
- Printing is intermittent or absent
  - Verify driver, ink supply, nozzles, cartridges
- Lines or dots are missing from the printed page
  - Clean the inkjet nozzles
- Ink streaks appear on the printed page
  - Clean the inkjet nozzles
- Paper jammed
  - Open back door, remove paper

Problems with Impact Printers

- Print quality is poor
  - Check ribbon advancement
  - Adjust the print head spacing
  - Check the print head for dirt
- Print head moves back and forth but nothing prints
  - Check ribbon installation
  - Check ribbon advancement
    - Jammed, dried out

Summary

Printer types include:
- Laser, inkjet, impact, solid ink, thermal, dye-sublimation

Six steps in laser printing:
- Cleaning, conditioning, writing, developing, transferring, and fusing

Printer metrics:
- Warm-up time, resolution, maximum duty cycle, printing speed, page formatting

Printer communication protocols:
- PostScript, PCL, Windows GDI, XPS

Windows printer configuration:
- Vista Printers window
- XP Printers and Faxes window

Routine maintenance:
- Extends working life of printers