

## Objectives

- ◆ In this session, you will learn to:
  - ◆ Identify the technical components of printers and scanners.
  - ◆ Identify printing and scanning processes.
  - ◆ Install and configure printers and scanners.
  - ◆ Maintain and troubleshoot printers and scanners.

## Printer and Scanner Components

- ◆ Following are the printer and scanner components:
  - ◆ Printer and scanner memory
  - ◆ Printer and scanner drivers
  - ◆ Printer and scanner firmware
  - ◆ Printer and scanner interfaces
  - ◆ Consumable printer components
  - ◆ Flatbed scanner components

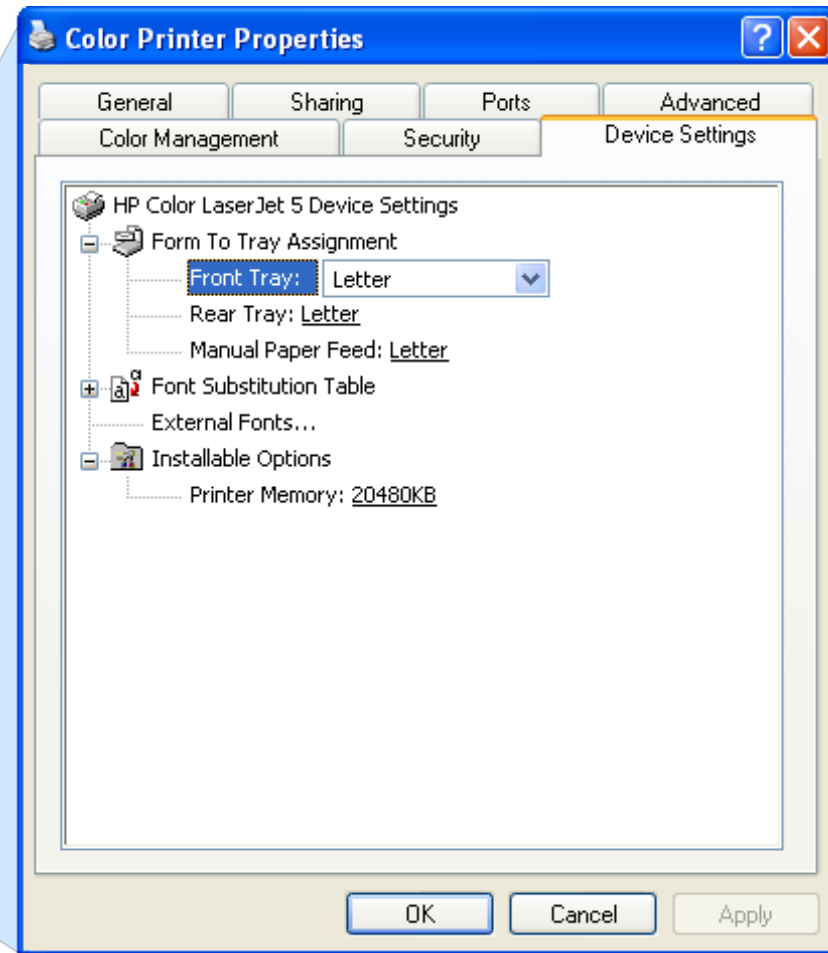
## Printer and Scanner Memory

- ◆ Printers and scanners have their own installed memory to store information about:
  - ◆ Device settings
  - ◆ Jobs in queue
  - ◆ Scanned images

## Printer and Scanner Drivers

- ◆ The printer and scanner drivers:
  - ◆ Enable the device to communicate with the computer system.
  - ◆ Control all device-specific functions
- ◆ Types of printer and scanner drivers are:
  - ◆ PostScript Printer Description (PPD)
  - ◆ Printer Control Language (PCL)
  - ◆ Raster/bitmap
  - ◆ Plotter/vector
  - ◆ Scanner

## Printer and Scanner Drivers (Contd..)



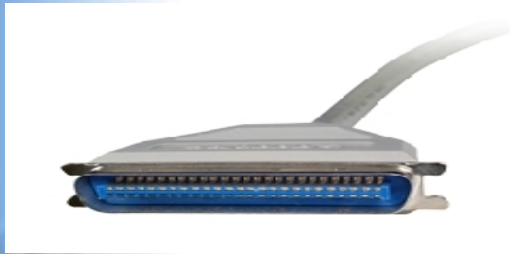


## Printer and Scanner Firmware

- ◆ The printers and scanners include built in firmware that:
  - ◆ Provides the on-board device management interface.
  - ◆ Enables configure printer and scanner functions
  - ◆ Helps monitor and manage print jobs

## Printer and Scanner Interfaces

◆ Following are the printer and scanner interfaces:



Parallel



Serial



USB



Firewire



SCSI



Wireless

## Consumable Printer Components

- ◆ Consumable printer components are:
  - ◆ Toner
  - ◆ Ink and ink cartridges
  - ◆ Paper and other media types



Toner



Ink and cartridges



Paper and other media



## Flatbed Scanner Components

- ◆ Flatbed scanner components are:
  - ◆ Scanner bed
  - ◆ Scanner cover
  - ◆ Light source
  - ◆ Scan head
  - ◆ Stabilizer bar
  - ◆ Stepper motor and belt

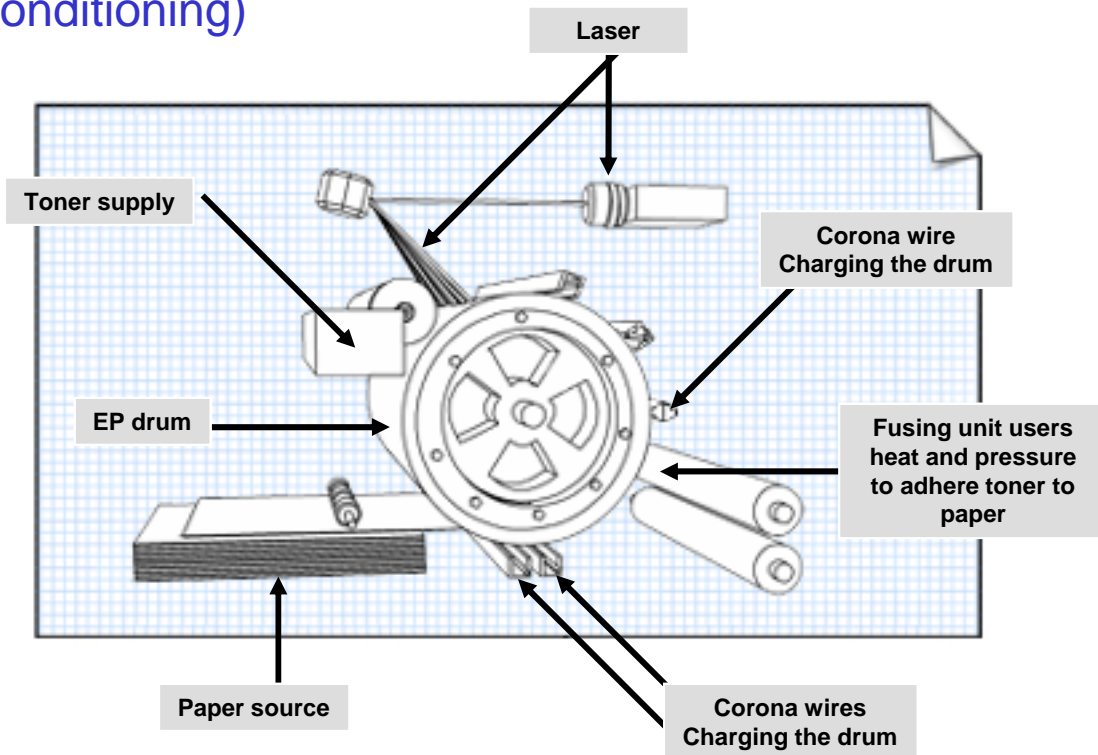
## Printer and Scanner Processes

- ◆ Following are the various printer and scanner processes:
  - ◆ The Laser Printing Process
  - ◆ The Inkjet Print Process
  - ◆ Thermal Print Processes
  - ◆ The Solid Ink Print Process
  - ◆ The Dot-matrix Impact Print Process
  - ◆ The Scanning Process

## The Laser Printing Process

◆ Following are the steps of laser printing process:

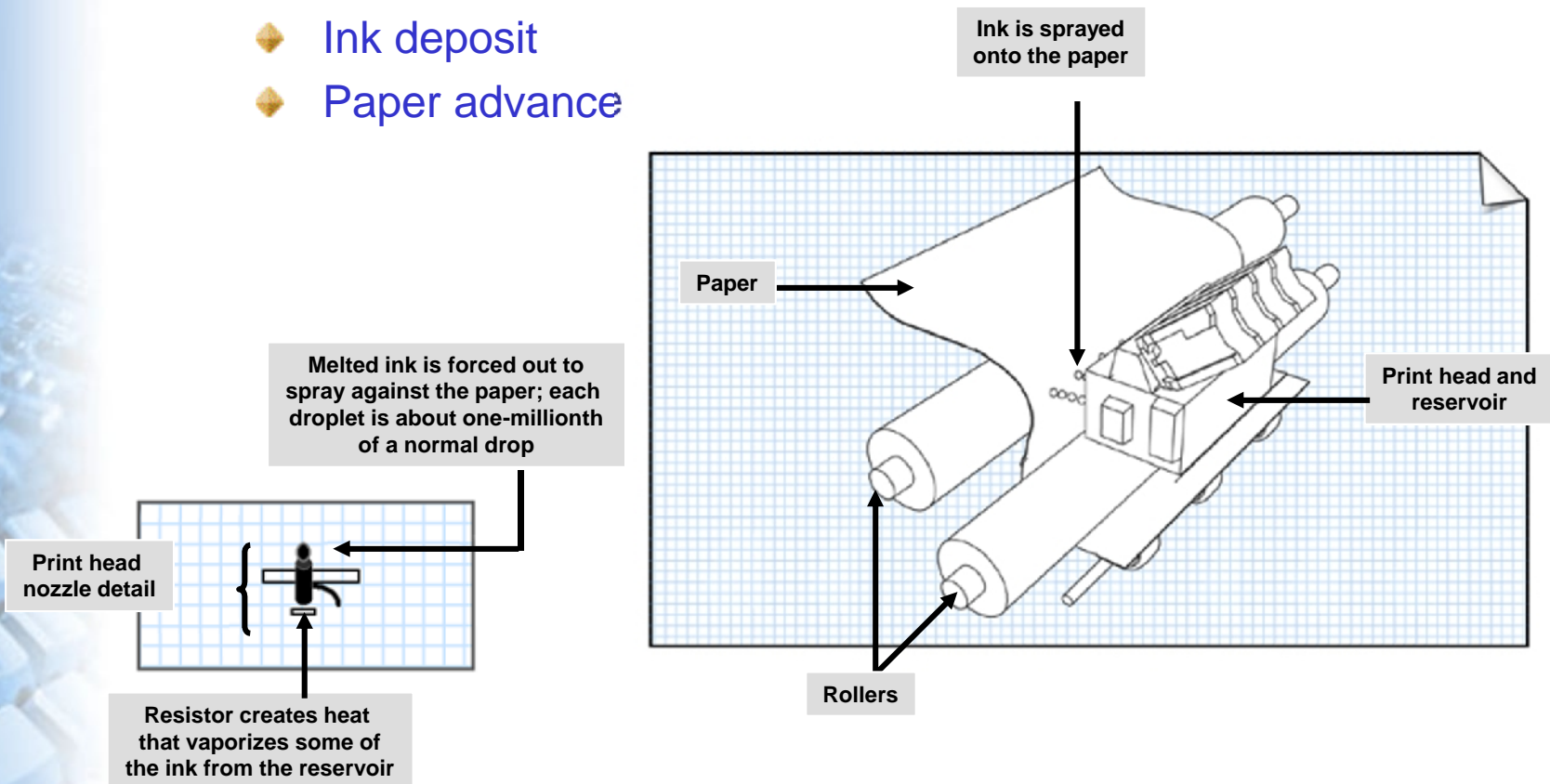
- ◆ Cleaning
- ◆ Erasing
- ◆ Charging (Conditioning)
- ◆ Writing
- ◆ Developing
- ◆ Transferring
- ◆ Fusing



## The Inkjet Print Process

◆ Following are the steps of inkjet printing process:

- ◆ Ink dispersion
- ◆ Ink deposit
- ◆ Paper advance





## Thermal Print Processes

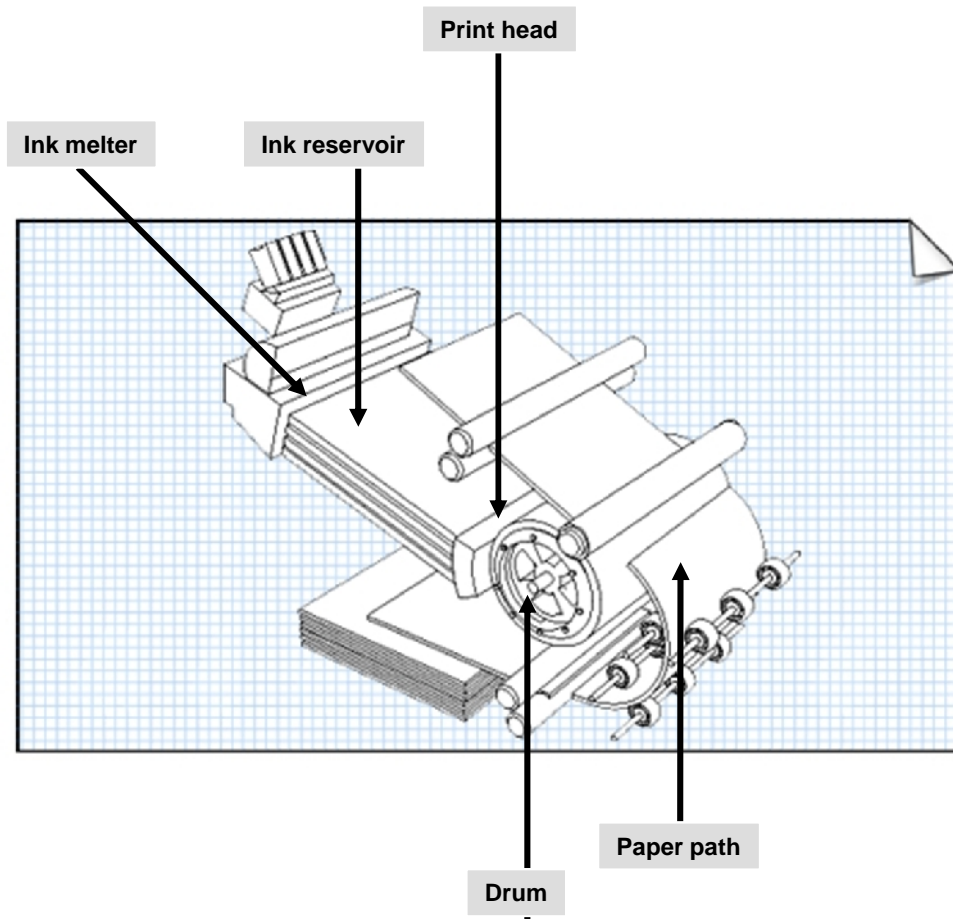
- ◆ Following are the steps of thermal printing process:
  - ◆ In thermal dye transfer printer
    - ◆ Diffuses dye from ribbons
  - ◆ In thermal wax transfer printer
    - ◆ Melts wax-based ink from ribbon
  - ◆ In direct thermal printer
    - ◆ Creates image with heated pins



## The Solid Ink Print Process

◆ Following are the steps of the solid ink print process:

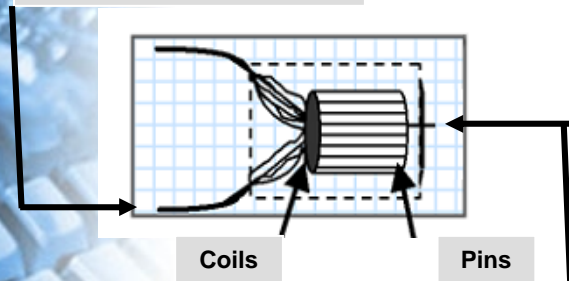
- ◆ Ink melt
- ◆ Ink transfer
- ◆ Image transfer



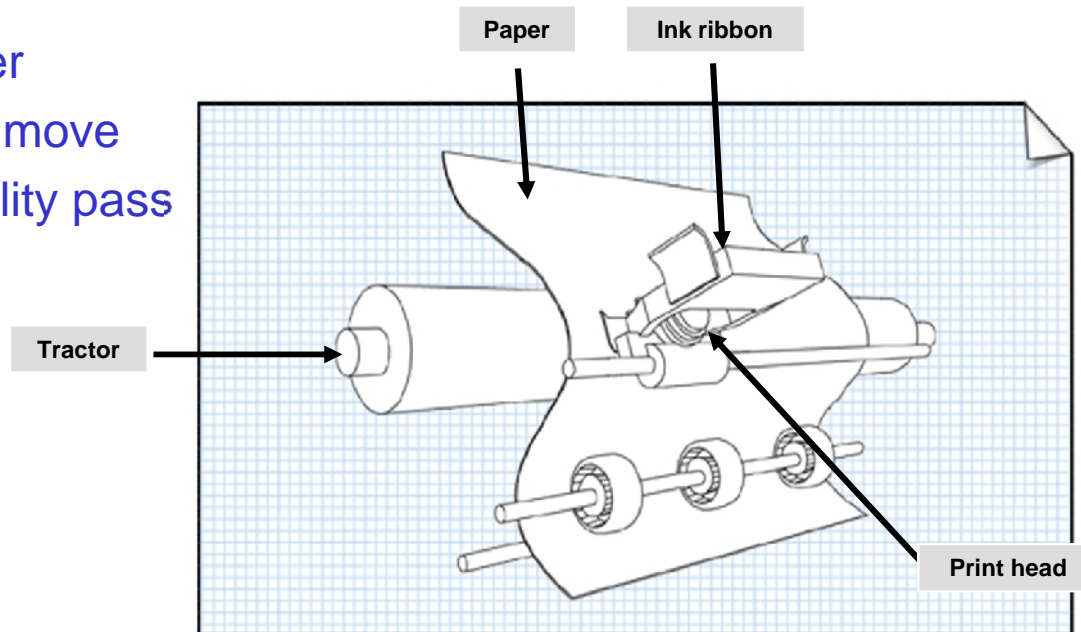
## The Dot-Matrix Impact Print Process

- ◆ Following are the steps of dot-matrix impact print process:
  - ◆ Pin strike
  - ◆ Ink transfer
  - ◆ Printhead move
  - ◆ Letter quality pass

Electrical signals from  
microprocessor

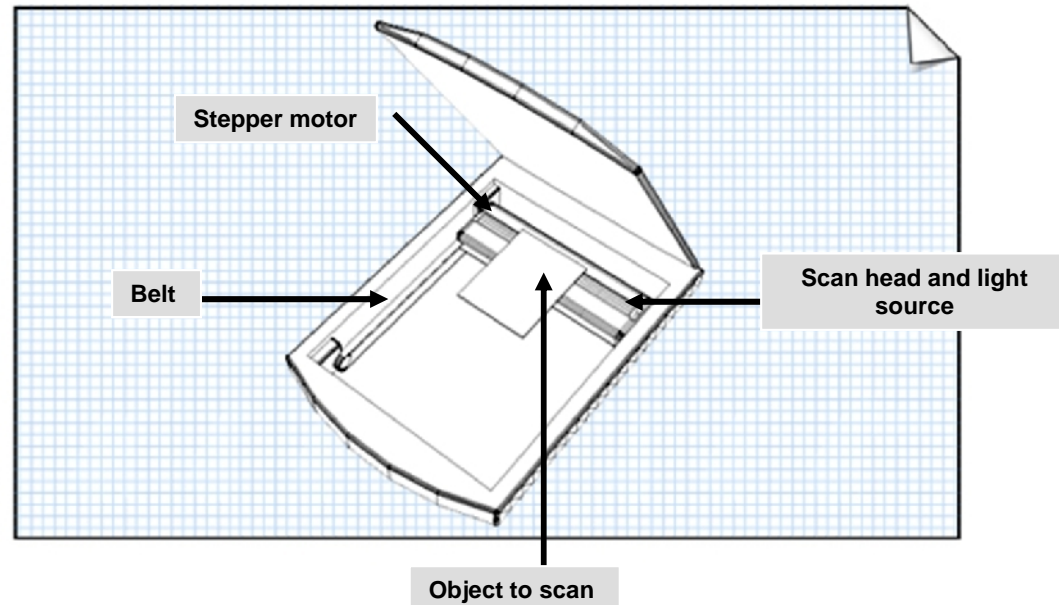


Electrical signals from  
microprocessor



## The Scanning Process

- ◆ Following are the steps of scanning process:
  - ◆ Document placement
  - ◆ Initialization
  - ◆ Scan
  - ◆ Digitization
  - ◆ Conversion
  - ◆ Recording



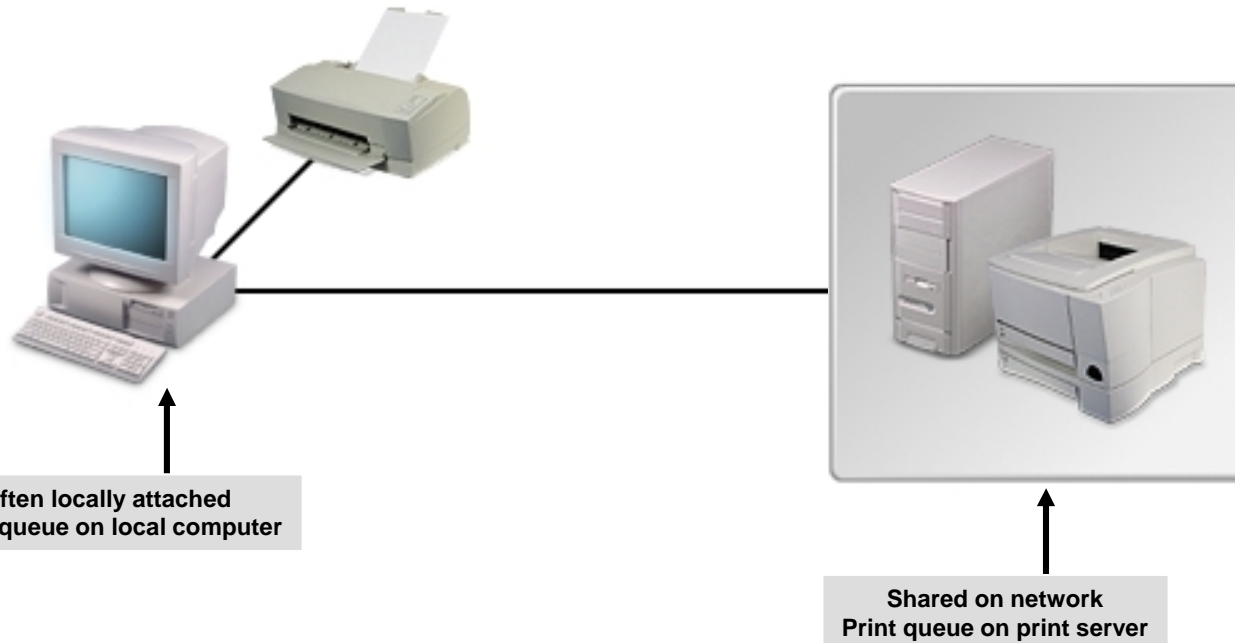


## Install and Configure Printers and Scanners

- ◆ Before installing and configuring printers and scanners, you need to understand following:
  - ◆ Local and network-based printers
  - ◆ Network-connected printers
  - ◆ The print spooler
  - ◆ The windows print process
  - ◆ Windows print permissions
  - ◆ Printer configuration options
  - ◆ Scanner performance factors

## Local and Network-based Printers

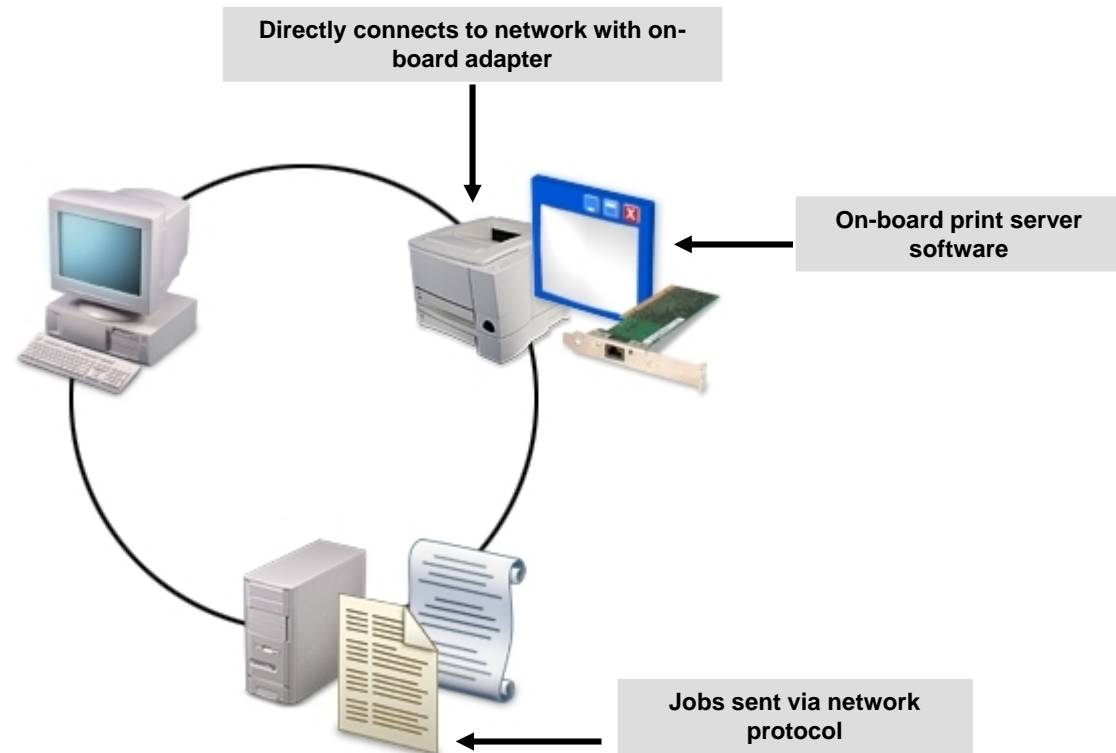
- ◆ **Local printers** are managed by and are generally physically attached to the local computer
- ◆ **Network-based** printers are shared print devices that are managed by a remote computer, called a print server.





## Network-Connected Printers

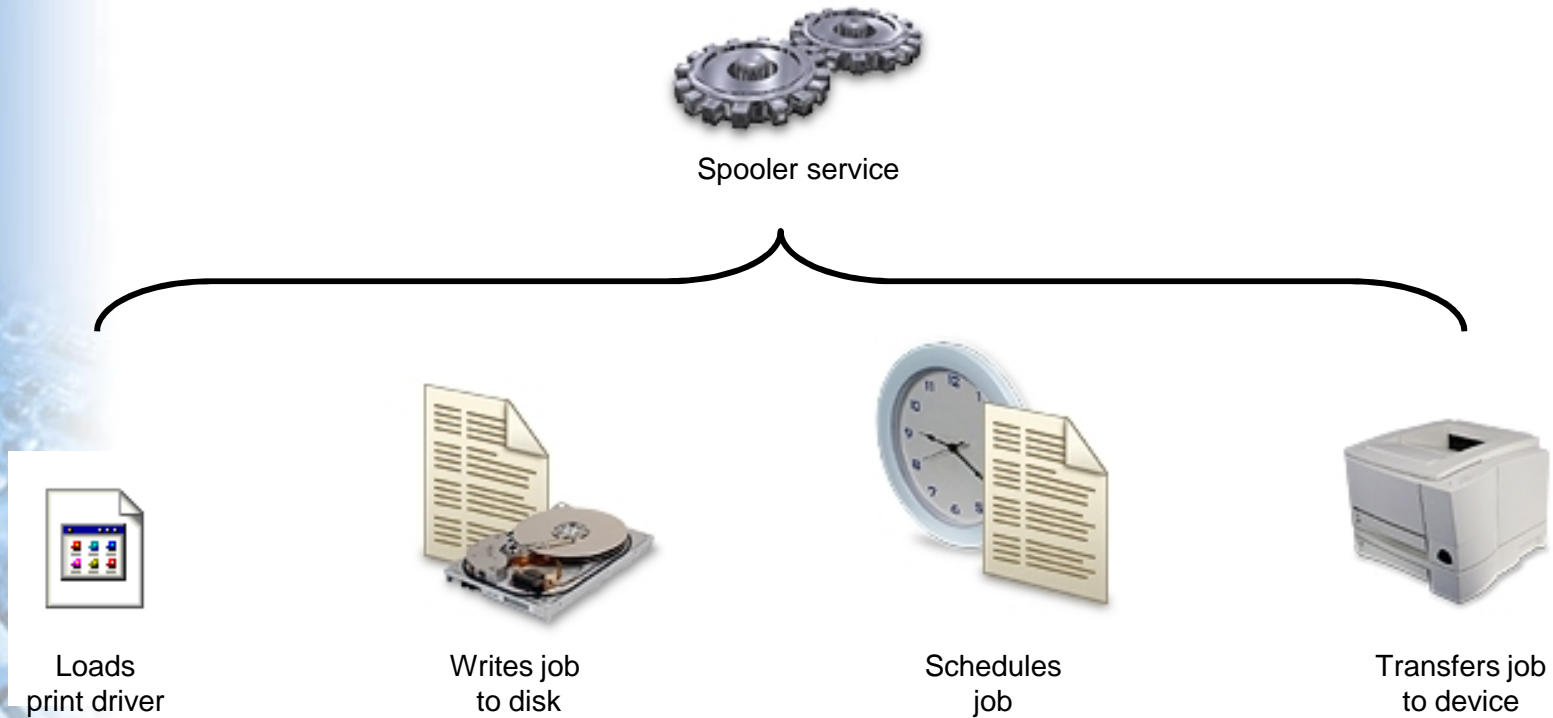
- ◆ **Network-connected printers** have built-in network adapter cards and connect directly to a network cable or via a wireless network interface.



## The Print Spooler

- ◆ The print spooler is the Windows system component that manages the entire printing process.
- ◆ Print spooler component are:
  - ◆ Graphics Device Interface (GDI)
  - ◆ Print provider
  - ◆ Print router
  - ◆ Print processor
  - ◆ Separator page processor
  - ◆ Port monitor

## The Print Spooler (Contd..)



## The Windows Print Process

- ◆ Following are the steps of Windows print process:
  1. User prints document
  2. Print driver renders print job
  3. Print spooler accepts job
  4. Print router determines if printer is local or remote
  5. If remote, remote print provider sends job over network



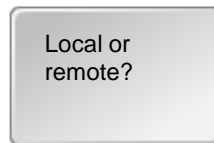
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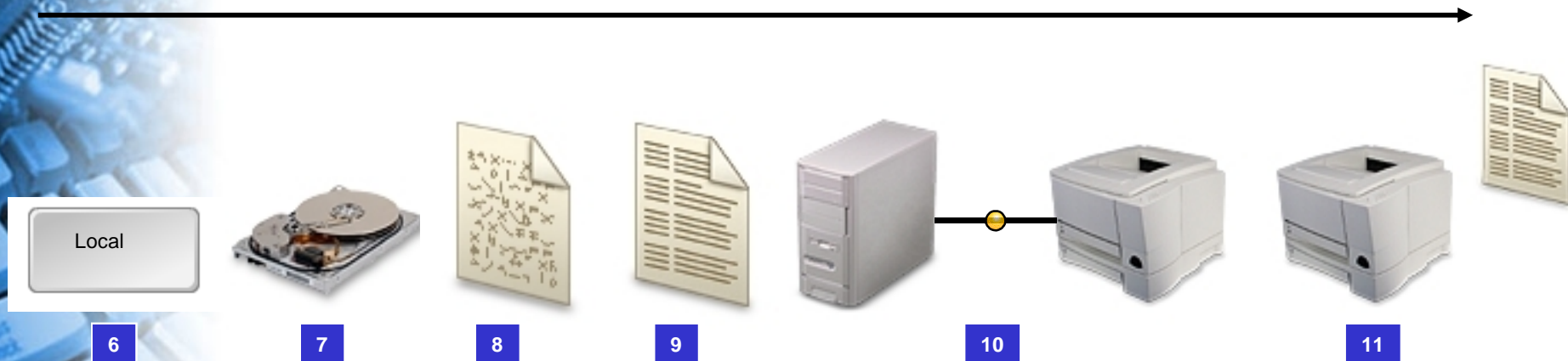


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## The Windows Print Process (Contd..)

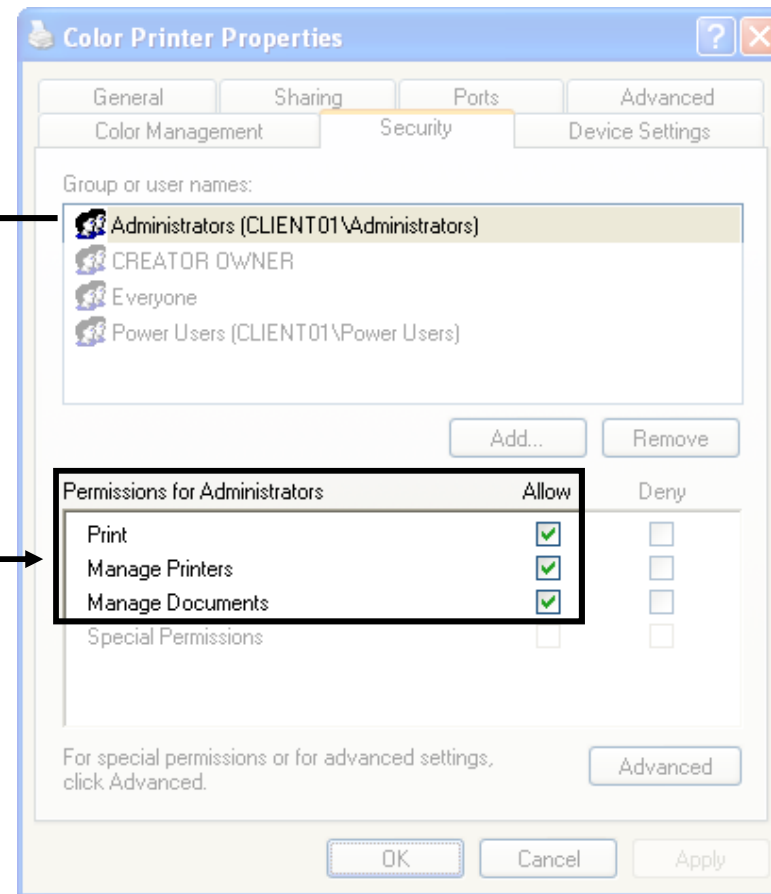
6. Print router determines that printer is local
7. Print provider spools job to disk
8. Print processor completes rendering
9. If necessary, separator page inserted
10. Port monitor transfers job to printer
11. Printer produces output





## Windows Print Permissions

- ◆ Windows print permissions are:
  - ◆ Print
  - ◆ Manage Printers
  - ◆ Manage Documents



## Printer Configuration Options

- ◆ Following are the printer configuration options are:
  - ◆ Device calibration
  - ◆ Media and paper tray assignments
  - ◆ Tray switching
  - ◆ Font substitutions
  - ◆ Print spool settings
  - ◆ Printer availability
  - ◆ Color management
  - ◆ Printer ports

## Scanner Performance Factors

- ◆ Following are the scanner performance factors:
  - ◆ Resolution
  - ◆ File formats
  - ◆ Default settings

## Activity 13-4

### Activity on Installing a Local Printer

## Activity 13-5

### Activity on Verifying the Printer Installation



## Maintain and Troubleshoot Printers and Scanners

- ◆ Before maintaining and troubleshooting printers and scanners, you need to understand following:
  - ◆ Preventative maintenance techniques
  - ◆ Common printer issues
  - ◆ Common scanner issues
  - ◆ Printer and scanner troubleshooting resources

## Preventative Maintenance Techniques

- ◆ Maintenance techniques for printer and scanner are:
  - ◆ Use the printer often to avoid the ink from drying out.
  - ◆ Run the printer's cleaning utility to clean the printhead.
  - ◆ Run the printer's nozzle test.
  - ◆ Regularly clean the paper path and the ribbon path using a dry soft cloth.
  - ◆ Replace the toner cartridge once it gets low.
  - ◆ Dust the scanner often.
  - ◆ Clean the glass bed of the scanner with a cloth and cleaner. The cleaner the glass bed of the scanner, the clearer your images will be.

## Common Printer Issues

- ◆ Common printer issues are:
  - ◆ Jobs are in print queue but do not print
  - ◆ Printer doesn't print the way the user expects it to print
  - ◆ User can't access network printer
  - ◆ Print output is garbled
  - ◆ Print jobs never appear in print queue
  - ◆ Other sporadic print problems

## Common Scanner Issues

- ◆ Common scanner issues are:
  - ◆ Scanner and computer do not communicate
  - ◆ General power or hardware problems
  - ◆ Scanner does not respond when buttons are pressed
  - ◆ Scanning software does not run properly
  - ◆ Scanner image quality is not correct
  - ◆ Scanner is slow
  - ◆ Specific scanner errors



## Printer and Scanner Troubleshooting Resources

- ◆ Printer and scanner troubleshooting resources are:
  - ◆ Extension magnet
  - ◆ Test patterns
  - ◆ General diagnostic utilities
  - ◆ Device documentation
  - ◆ Manufacturers' websites
  - ◆ Software vendors' websites
  - ◆ Error logs and reports
  - ◆ Service logs and reports
  - ◆ Troubleshooting principles

## Summary

- ◆ In this session, you learned that:
  - ◆ Printer and scanner have various components, such as memory, driver and firmware.
  - ◆ Each printer and scanner have specific printing process.
  - ◆ How to install and configure printer and scanner.
  - ◆ Preventative maintenance techniques and networking tools help maintain and troubleshoot network connections.
  - ◆ What are the common printer and scanner issues.