Chapter Seven

BIOS and Printers

Outline

- Overview of BIOS
- Function of BIOS
- The Boot Process
- Printer Basics
- Types of Printers
- Troubleshooting printer problems

BIOS Overview

- Starting a computer or a computer-embedded device is called **booting.**
- Booting takes place in two steps
  - ✓ Switching on power supply
  - ✓ Loading operating system into computer's main memory.

BIOS Overview

- A special kind of program is required to enable the CPU to talk to other devices
- A ROM chip stores these programs
- These programs are collectively known as the Basic Input/Output System(BIOS).

BIOS Overview

- Programs stored on ROM chips are known as **firmware**
- Programs stored on erasable media are called **software**
- **BIOS** is a group of programs.
- ROM is a hardware chip used to store **BIOS**.

BIOS Overview

- The first program or set of instructions that run when the computer is switched on is called **BIOS** or **Basic Input Output System**.
- BIOS is a **firmware**, i.e. a piece of software permanently programmed into the hardware.

BIOS Overview

- There are two types of booting –
- **Cold Booting** – When the system is started by switching on the power supply it is called **cold booting**.
- The next step in cold booting is loading of BIOS.
- **Warm Booting** – When the system is already running and needs to be restarted or rebooted, it is called **warm booting**.
- Warm booting is faster than cold booting because BIOS is not reloaded.

BIOS Overview

- If a system is already running but needs to be restarted, it is called **rebooting**.
- Rebooting may be required if a software or hardware has been installed or system is unusually slow.

BIOS Overview

- The BIOS is located on a chip inside of the computer and is designed in a way that protects it from disk failure.
- When you turn on a PC, the BIOS first conduct a basic hardware check, called a Power-On Self Test (POST), to determine whether all of the attachments are present and working.

BIOS Overview

- Then it loads the operating system into your computer's random access memory, or RAM.

– Initiated when the computer is turned on.

– Checks out the system every time the computer boots

- The BIOS also manages data flow between the computer's operating system and attached devices.

Function of BIOS (1)

- The main functions of the BIOS are:

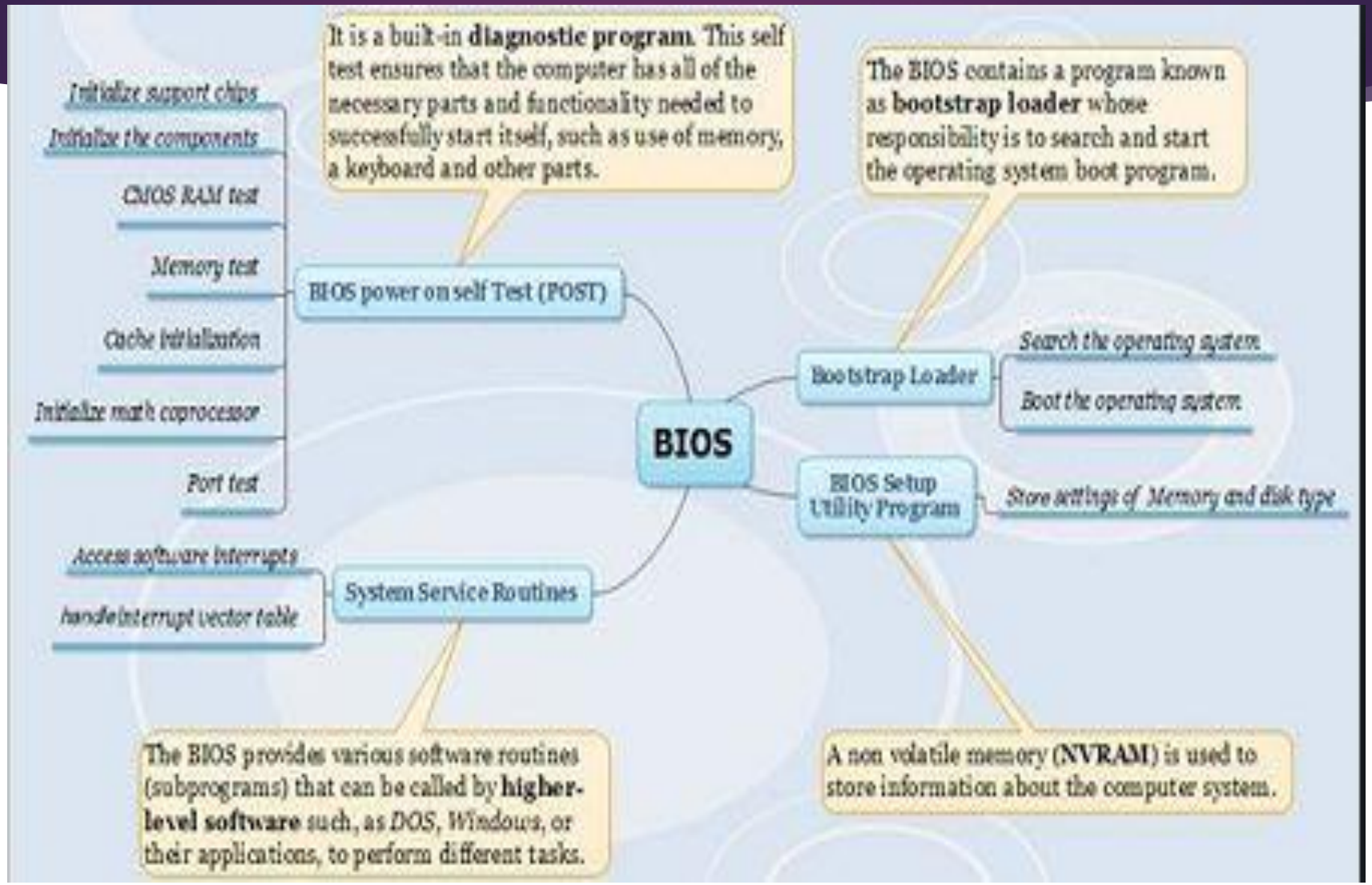
I. POST (Power on Self Test)

II. Bootstrap Loader

III. System Service Routines

IV. BIOS Setup Utility Program

Function of BIOS (2)



Function of BIOS (3)

(i) BIOS Power on Self Test (POST): It is a built-in diagnostic program.

- This self test ensures that the computer has all of the necessary parts and functionality needed to successfully start itself, such as use of memory, a keyboard and other parts.
- Then additional tests are done during booting. If errors are detected during the test, the BIOS instruct the computer to give a code that reveals the problem.
- Error codes are typically a series of beeps heard shortly after startup.

Function of BIOS (4)

(ii) **Bootstrap Loader**: Responsible to boot the operating system.

- The BIOS contains a program known as bootstrap loader whose responsibility is to search and start the operating system boot program.
- Then the boot program of operating system controls the computer system and boots the operating system.

Function of BIOS (5)

(iii) **System Service Routines:** The BIOS provides various software routines (subprograms) that can be called by higher-level software such, as DOS, Windows, or their applications, to perform different tasks.

The Boot Process (1)

- The CPU is the first component that gets initialized when the computer is turned on.
- It reads a special wire called **power good** once the power supply provides the proper voltage to the CPU.
- Every CPU has a built-in memory address with the first line of the POST program on the system ROM.

The Boot Process (2)

- The last BIOS function called by POST is the bootstrap loader.
- The bootstrap loader loads the operating system either from the floppy, the CD drive or the hard/flash drive and sometimes from the network.
- The bootstrap loader generates an error if it cannot find the bootable disk.

Computer POST and beep codes (1)

- The computer POST (power-on self-test) checks a computer's internal hardware for compatibility and connection before starting the remainder of the boot process.
- If the computer passes the POST, the computer may give a single beep (some computers may beep twice) as it starts and continue to boot.
- However, if the computer fails the POST, the computer will either generate a beep code or Error Message that tells the user the source of the problem.

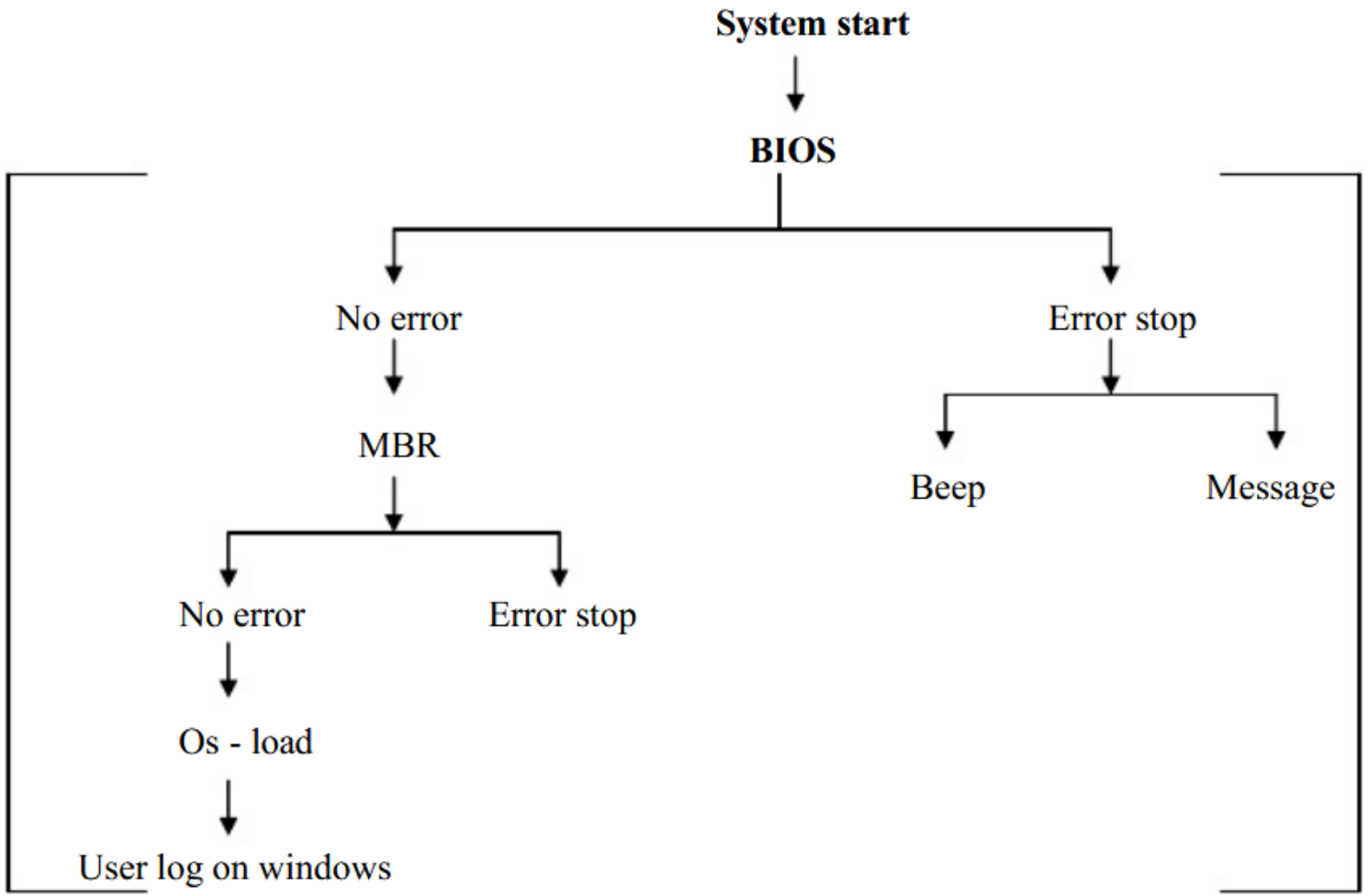
Computer POST and beep codes (2)

- When we switch on the power of a computer it literally rediscover itself.

  This is done through POST (Power On Self Test).

- During Post the system BIOS communication with all essential hardware devices like keyboard, disk drives, RAM, display adaptor etc.
- If one of the device reports on error condition back to the BIOS, then the BIOS reports this back to the user by using special POST error code.
- It gives message by 2 ways
  - Message Error (Numeric and Text Code)
  - Beep error

Computer POST and beep codes (3)



Computer POST and beep codes (4)

Message error code

Error Codes	Devices
100 Series (100-199)	Motherboard
200 Series (200-299)	RAM
300 Series (300-399)	Keyboard
400 Series (400-499)	Monochrome Video
500 Series (500-599)	Color Video
600 Series (600-699)	Floppy drive
1700 Series (1700-1799)	Hard Disk

Computer POST and beep codes (5)

Beep error code

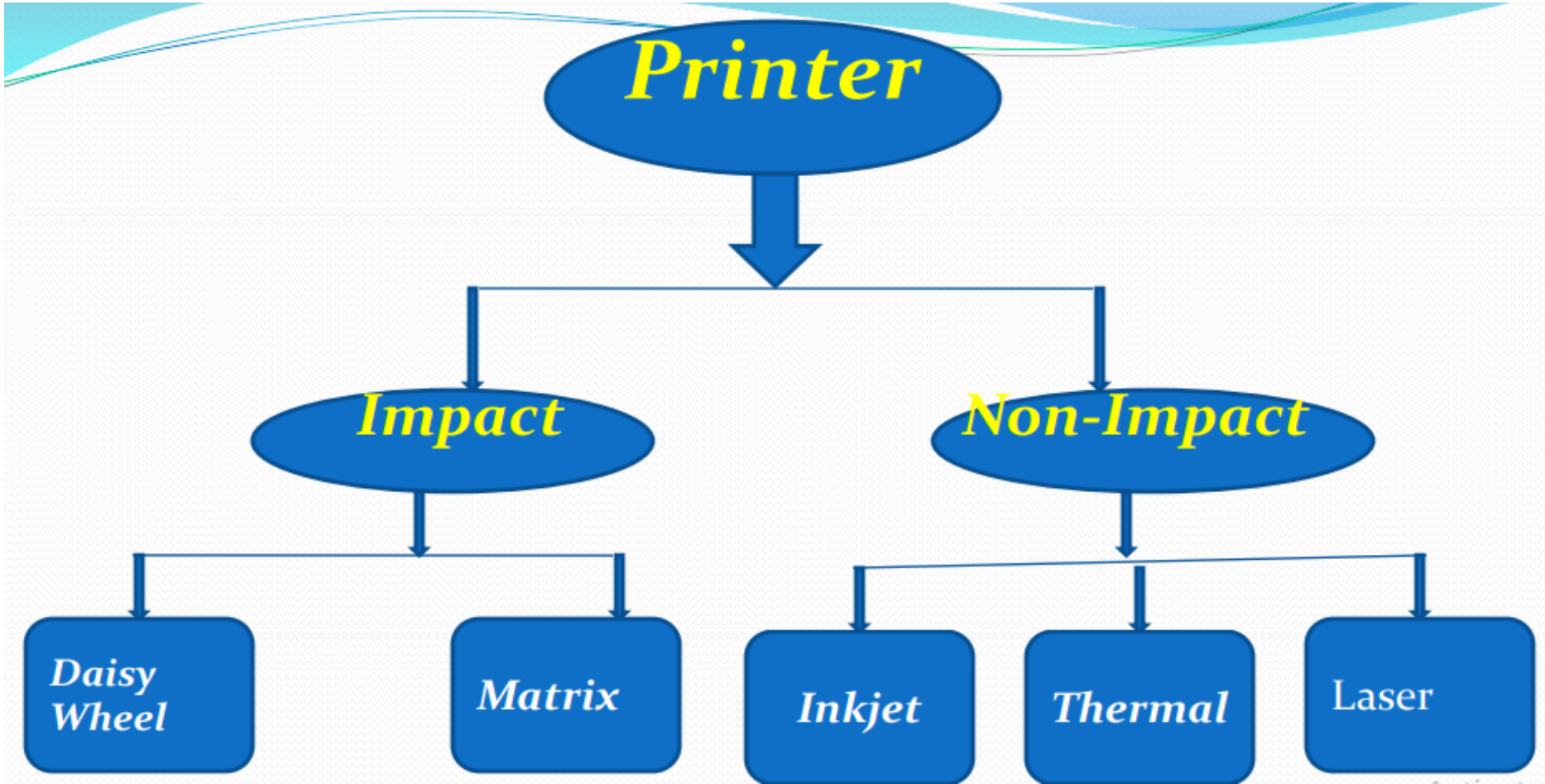
Because of the wide variety of different computer manufacturers, the beep codes may vary.

Printer Basics

What is Printer

- An external hardware device responsible for taking computer data and generating a hard copy of that data.
- Printers are one of the most commonly used peripherals and they print text and still images on the paper.

Types of Printer



Impact Printer

- These printers have a mechanism that touches the paper to create an image.
- Printers work by banging a print head containing a number of metal pins which strike an inked ribbon placed between the print head and the paper.

Non-Impact Printer

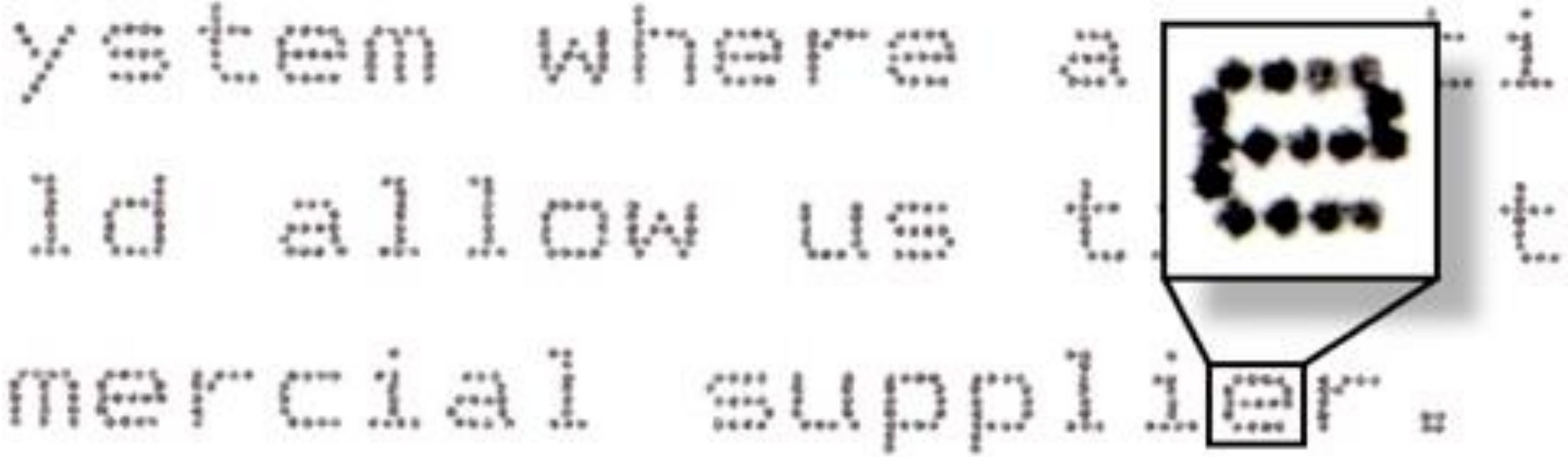
- These printers create an image on the print medium without the use of force.
- They don't touch the paper while creating an image.
- Non-impact printers are much quieter than impact printers as they don't strike the paper.

Impact Printer: Dot Matrix

- The term dot matrix refers to the process of placing dots to form an image.
- Its speed is usually 30 to 550 characters per second (cps).
- This is the cheapest and the most noisy printer and has a low print quality.
- The dot matrix forms images one character at a time as the print head moves across the paper.
- Uses tiny pins to hit an ink ribbon and the paper much as a typewriter does.

Dot Matrix Printer

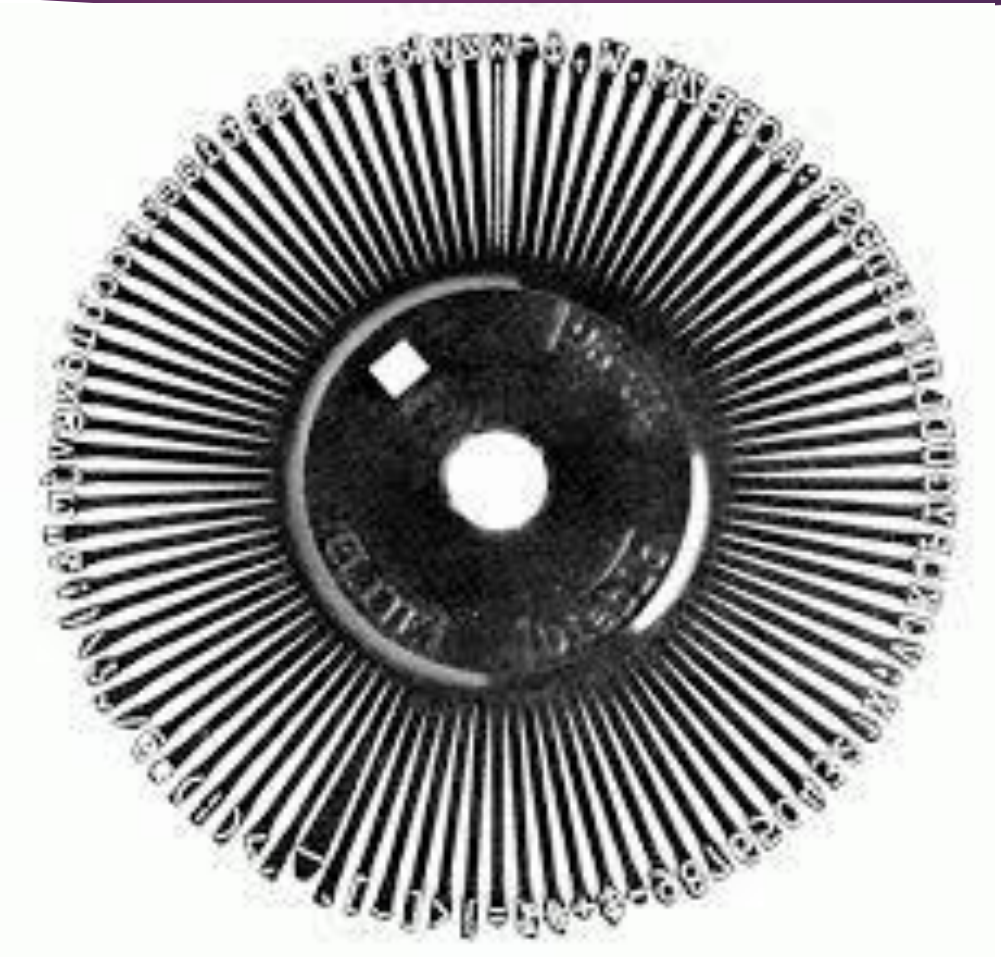
- A dot matrix printer fires off rows of pins that strike the ribbon in patterns to create the image or characters that need to be printed.



Impact Printer: Daisy Wheel

- A daisy wheel printer is basically an impact printer consisting of a wheel and attached extensions on which molded metal characters are mounted.
- A daisy wheel printer produces letter quality print and it can't produce graphics output.
- In a daisy wheel printer, a hammer presses the wheel against a ribbon which in turn makes an ink stain on the paper in the form of a character mounted on the wheel extensions.
- Its printing speed is also very slow ,i.e. less than 90cps.

Daisy Wheel Printer



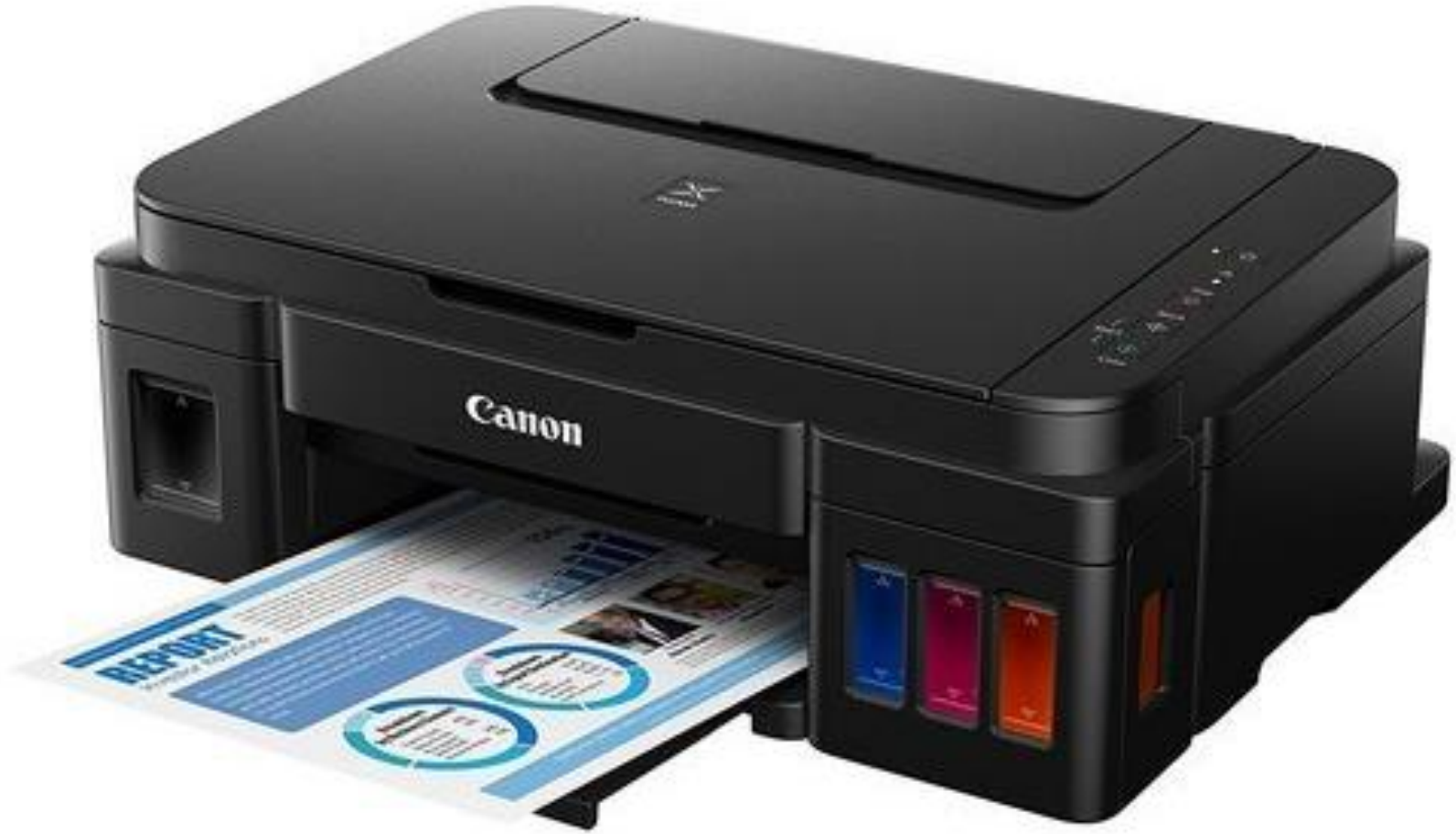
Non-Impact Printer: Ink jet

- It is a non-impact printer producing a high quality print.
- A standard Inkjet printer has a resolution of 300dpi.
- Print head having four ink cartridges moves .
- Software instructs where to apply dots of ink, which color and what quantity to use.

Ink jet Printer

- Electrical pulses are sent to the resistors behind each nozzle.
- Vapor bubbles of ink are formed by resistors and the ink is forced to the paper through nozzles.
- Inkjet printers offer the next highest level of print quality and are relatively cheap compared to laser printers. They are great for home use or small office environments that don't have large print jobs.
- A matrix of dots forms characters and pictures.

Ink jet Printer



Multi-function printer

- A multi function printer abbreviated as MFP is an all purpose device that prints, faxes, copies and scans.
- A single multi function printer can replace several bulky devices.
- A multi function printer is also known as **AIO**.
- These printers use inkjet technology and provide high quality print but at slow speed.

Multi-function printer



Non-Impact Printer: Laser

- The *laser printer,* also known as a *page printer* because it prints one page at a time.
- It is the most popular type of printer because it is fast, reliable, and has the best-quality printout of the three types of printers.
- The laser printer gets its name because it uses a laser beam in the printing process. The laser printer is also the most expensive type of printer due to its high-cost components such as the laser.

Non-Impact printer: Thermal

- A thermal printer is a printer that makes use of heat in order to produce the image on paper.
- Due to quality of print, speed, and technological advances it has become increasingly popular.
- Thermal printing does not make use of ink or toner unlike many other printing forms but largely depends on thermal papers for producing the images.

Thermal printer

- Thermal printers use heated pins and ribbons with different color bands.
- These printers contain a stick of wax like ink.
- The ribbon passes in front of a print head that has a series of tiny heated pins.
- The pins cause the wax to melt and adhere to the paper and when temperature reaches to a certain level, it is hardened.

3-D Printer

- 3D printing is a process of melting plastic filament and creating solid objects by building them up in very thin layers.
- The technology is used in a wide range of industries from construction to aerospace, and is now starting to make its way into the mainstream.

3-D Printer



Some 3-D Printer products











Types of Printer Connections

There are a number of different ways to connect a printer to a computer — the following are the most popular methods:

- Parallel connections
- Network connections
- Universal Serial Bus (USB)
- Serial
- Infrared
- FireWire and SCSI

Troubleshooting Printer Problems

1. Check the simple stuff first
   - Power connected, Printer on.
2. Paper jams
   - Are you using correct type of paper for the printer.
3. Garbled or corrupted output
   - May driver has gone corrupt or that you have the wrong driver installed (print a test page).

Troubleshooting Printer Problems

4. Slow printing
   - Verify that spooling is enabled. Spooling is enabled by default.
5. Spooling service problems
   - The *print spooler service* is responsible for managing the printing environment.
   - Stop and restart the print spooler service in Windows.

End of Chapter 7