TOPIC 2: COMPUTER HARDWARE

UNIT FOUR: OUTPUT DEVICES

Unit Introduction

Output is data that has been processed into a useful form called information.

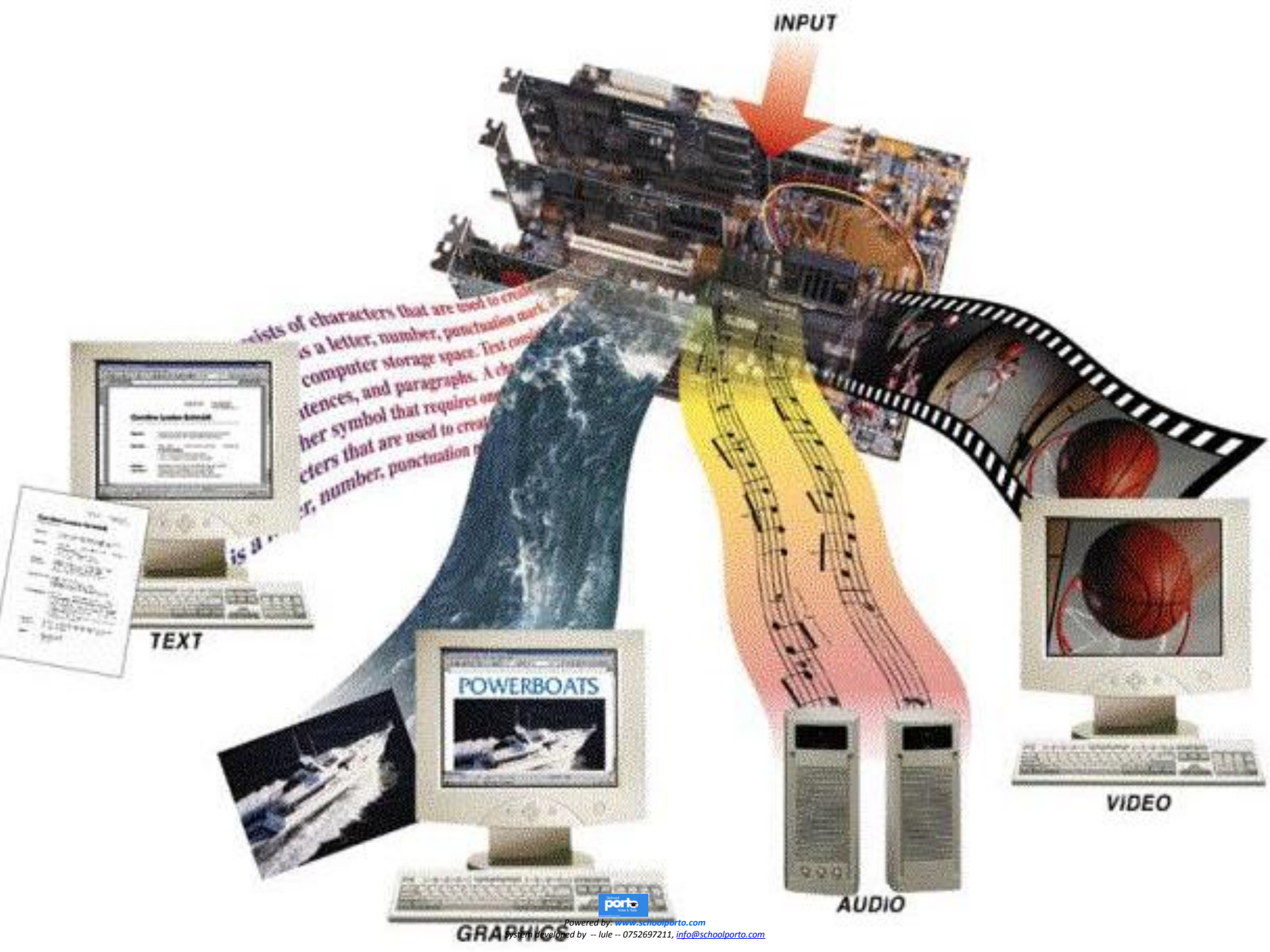
Computers generate several types of output, depending on the hardware and software being used and the requirements of the user.

An output device is any type of hardware component capable of conveying information to one or more people.

Commonly used output devices include (A)Display devices, (B)printers, (C) Audio Output Devices and (D) Other.

Categories of Computer output.

While working with a computer, a user encounters four basic categories of output:
Text, (characters that are used to create words, sentences, and paragraphs)
Graphics (nontext information such as drawings and charts),
Audio(music, speech, or any other sound)
Video (full-motion images played back at various speeds)



(A) Display Devices/ VDUs

A display device is an output device that visually conveys text, graphics, and video information. Information shown on a display device often is called soft copy, because the information exists electronically and is displayed for a temporary period of time. Display devices are also known as (Visual Display Units (VDUs)

Commonly used display devices include (i)CRT Monitors, (ii)LCD Monitors, (iii)Plasma monitors , (iv)Projectors, (v)Headgears and (vi)LED displays .

CRT Monitors

A CRT (cathode ray tube) monitor is a desktop screen that contains a large sealed glass cathode-ray tube.

Inside the CRT, an electron beam moves back and forth across the back of the screen.

This causes dots on the front of the screen to glow, producing an image on the screen.

Each dot consists of a red, a green, and a blue phosphor, which combine to make up a pixel.

A *pixel* *is a single point in an electronic image.*

CRT Monitors

It is advisable to always sit 1 meter way from CRT monitors because they produce electromagnetic radiation, posing a health risk.

Flat-Panel Displays

A flat-panel display is a lightweight display device with a shallow depth and flat screen that typically uses LCD (liquid crystal display) or gas plasma technology.

Examples of flat -panel displays include LCD monitors, and plasma monitors.

Many are widescreen, ie much wider than they are tall.

Screens are measured diagonally from one corner to the other. Common sizes are 17”, 19”, 20”, 22”, 24” and 27”, 45” and 65 inch screens

Plasma and LCD monitors

Data Projectors

A data projector takes the image that displays on a computer screen and projects it onto a large screen or wall so that an audience of people can see the image clearly.

For example, many classrooms use data projectors so that all students easily can see an instructor's presentation on the screen.

Presence of excess light affects data projectors and so they perform well in dark rooms.

Data Projectors

Head mounted display (HMD) / headgear

A headgear is made up of two tiny display and sound systems that channel images and sound from the source to the eyes and ears, thus presenting a stereo three dimensional sound effect in the virtual world.

The wearer may also put on a body suit that senses the body movement and relays the data into the virtual reality system which in turn adjusts the position of the user in the system.

HMD

LED displays

A LED display is a flat panel display, which uses light-emitting diodes as a video display.

A LED panel may be a small display, or a component of a larger display.

They are typically used outdoors in store signs and billboards.

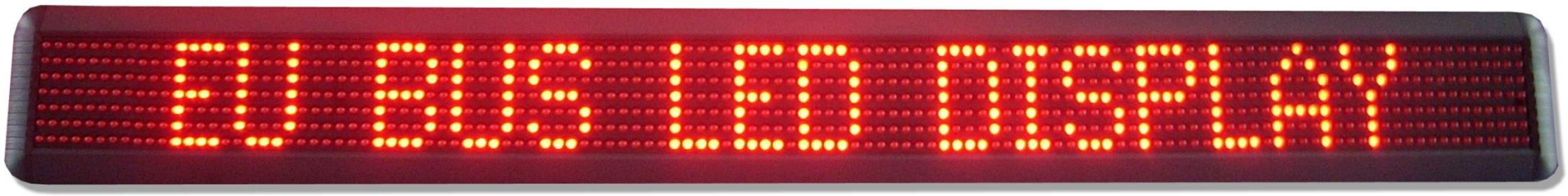
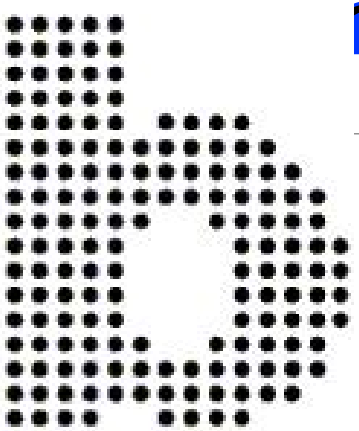


Illustration: Outdoor LED Displays

More Terms associated with Display Devices

1. Resolution is the number of horizontal and vertical pixels in a display device. A higher resolution uses a greater number of pixels and thus provides a smoother, sharper, and clearer image. Resolution is measured in dpi (dots per inch)
2. Dot pitch, aka pixel pitch, is the distance in millimeters between pixels on a display device. Text created with a smaller dot pitch is easier to read.



Printers

A printer is a device that produces a hard copy output such as text and graphics on a physical material like paper.
Printed information (hard copy) exists physically and in a more permanent form than a soft copy on a display device.
Printers with different speeds, features, quality, and capabilities are available in a range of prices.
Printers can be grouped into two categories: impact and nonimpact printers.

IMPACT PRINTERS

An impact printer forms characters and graphics on a piece of paper by a striking mechanism against an ink ribbon that physically contacts the paper.

Impact printers are noisy because of this striking activity.

Large Businesses, use impact printers because these printers can withstand dusty environments, vibrations, and extreme temperatures.

Commonly used types of impact printers include Daisy wheel, dot-matrix , Braille and line printers.

Daisywheel printer

This is a kind of impact printer where characters are arranged on the ends of the spokes of a wheel.

The wheel (usually made of plastic) is rotated to select the character to print and then an electrically operated hammer bends the selected spoke forward slightly, squeezing in an ink ribbon between the character and the paper, as in a typewriter.

One advantage of this arrangement over that of a typewriter is that different wheels may be inserted to produce different typefaces (font styles and sizes)

Daisywheel printer (cont)

Low speed and noise are its disadvantages. The speeds are between 20 to 90 characters per second (cps)

Dot-matrix printer

A dot-matrix printer produces printed images when tiny wire pints on a print head mechanism strike an inked ribbon like in a type writer.
When the ribbon presses against the paper, it creates dots that form characters and graphics.
Most dot-matrix printers use continuous-form paper, in which thousands of sheets of paper are connected together end to end. The papers have holes along the sides to help feed the paper through the printer.
Dot matrix printers provide cheap but low quality printing.

Dot Matrix Printer

Braille printers

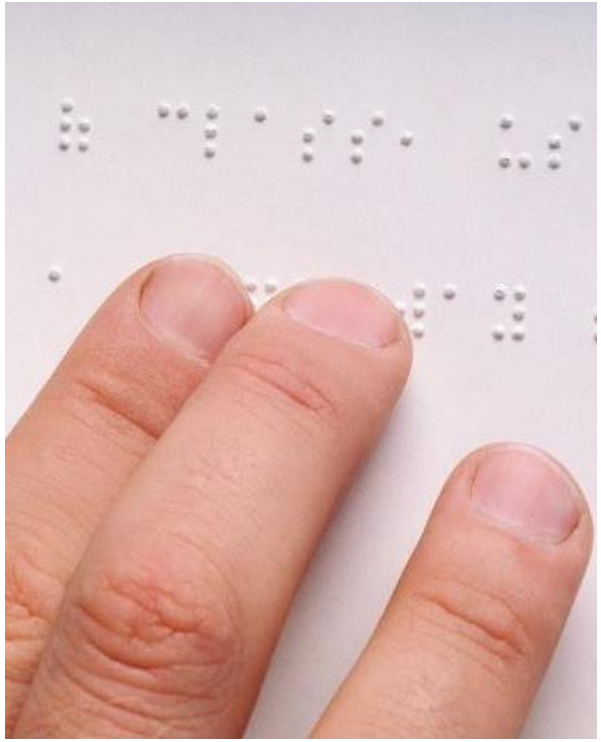
A Braille printer, commonly known as a Braille embosser, is an impact printer, that renders text as tangible dot cells which are felt and read by the blind.

Using Braille translation software, a document can be embossed with relative ease and efficiency.

They need special Braille paper which is thicker and more expensive than normal paper.

Once a copy produced, printing further copies is often quicker by means of a device called a "thermoform", which produces copies on soft plastic.

Braille printers



Line printers

A line printer is a high-speed impact printer that prints an entire line at a time.

The speed of a line printer is measured by the number of lines per minute (lpm) it can print.

Some line printers print as many as 3,000 lpm.

Mainframes, servers, or networked applications, such as manufacturing, distribution, or shipping, often use line printers.

IBM line printer

NON-IMPACT PRINTERS

A nonimpact printer forms characters and graphics on a piece of paper without actually striking the paper.

Some spray ink, while others use heat or pressure to create images.

Commonly used nonimpact printers are ink-jet printers, laser printers, thermal printers, plotters, and mobile printers.

Ink-jet printer

An ink-jet printer forms characters and graphics by spraying tiny drops of liquid ink onto a piece of paper.

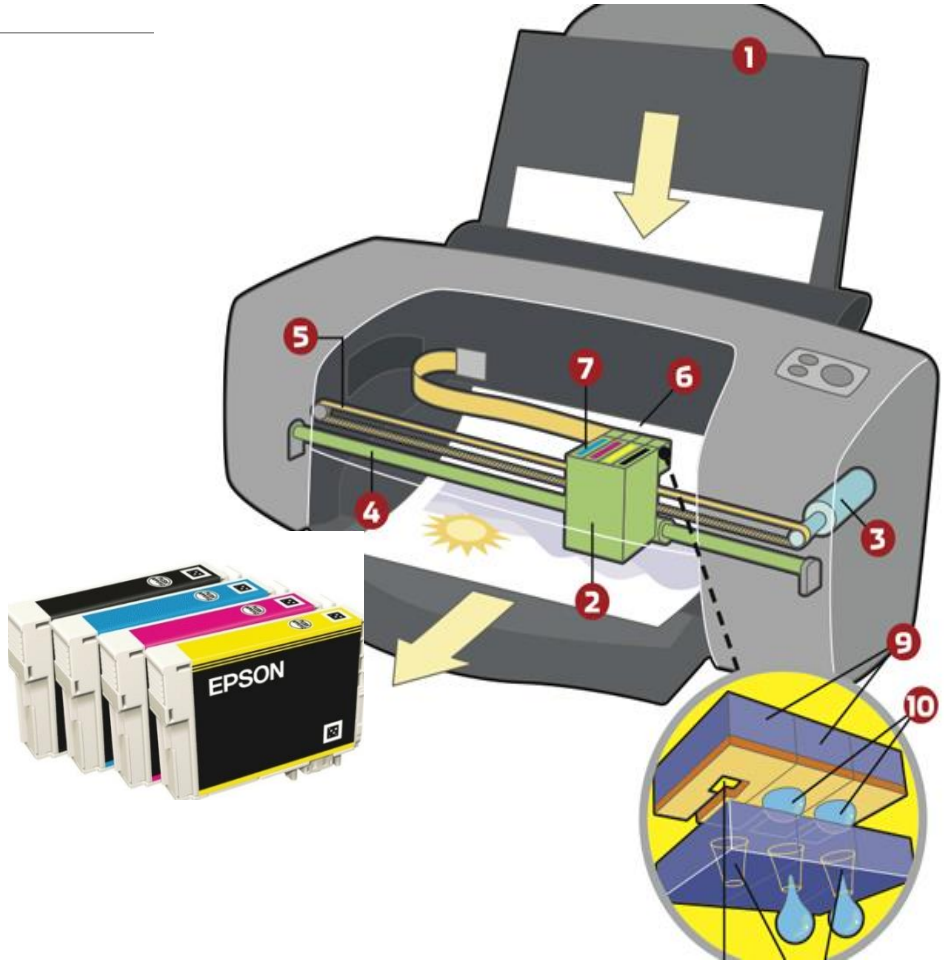
Ink-jet printers produce text and graphics in both black-and-white and color on a variety of paper types & sizes.

The print head mechanism in an ink-jet printer contains ink-filled print cartridges.

Each cartridge has very many small ink holes, or nozzles.

The ink propels through a combination of the holes to form a character or image on the paper.

Ink-jet printers (illustration)



Laser printer

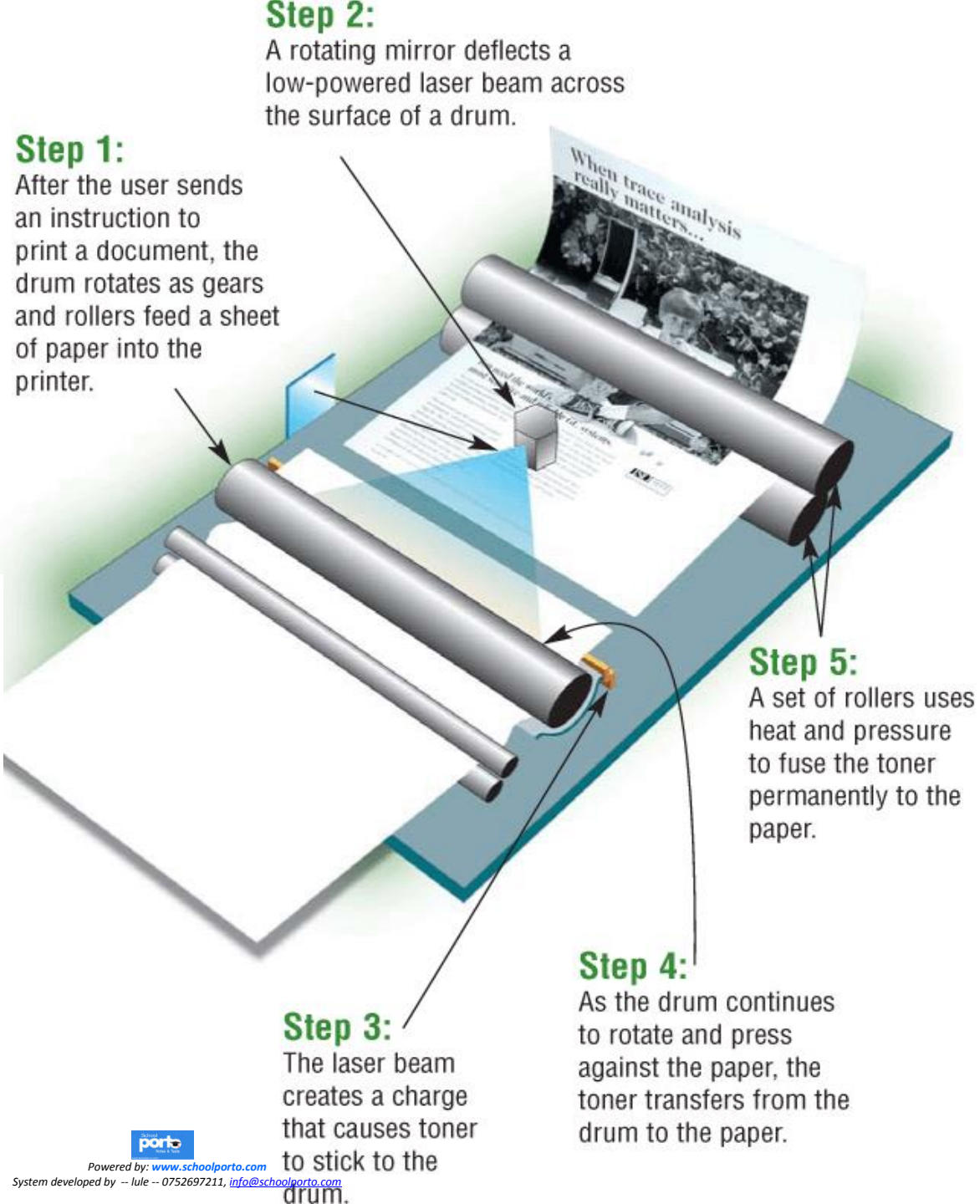
A *laser printer* is a high-speed, high quality nonimpact printer.

Operating in a manner similar to a copy machine, a laser printer creates images using a laser beam and powdered ink, called *toner*, which is packaged in a cartridge.

When printing a document, laser printers process and store the entire page before they actually print it. For this reason, laser printers sometimes are called *page printers*.

Storing a page before printing requires the laser printer to have a certain amount of inbuilt memory.

Laser Printer (cont)



Thermal printers

A thermal printer generates images by pushing heated pins against a coated heat-sensitive paper.
The coating turns black in the areas where it is heated, producing an image.
Basic thermal printers are cheap, but the print quality is low and the images tend to fade over time.
Thermal printing technology is, however, ideal for use in small devices e.g. ATM receipt printers.

Thermal Printers

Plotters

Plotters are printers used to produce large, high-quality, vector graphic drawings such as blueprints, maps, posters, and signs.

These printers are usually very costly, and are used in specialized fields such as engineering, and graphic art.

They use ink-jet printer technology, on a much larger scale, to print professional quality displays.

Plotters

Mobile Printers

A mobile printer is a small, lightweight, battery powered printer that allows a mobile user to print from a notebook computer, Tablet PC, PDA, smart phone or other personal mobile device while traveling.

They fit easily in a briefcase alongside a notebook computer.

Mobile printers mainly use ink-jet, thermal, wax-transfer, or dye-sublimation technology.

Mobile Printers

Terms associated with Printers

1. Toner is a powder used in laser printers and photocopiers to form the printed text and images on the paper.
2. dpi. (Dots per inch) is a measure of the number of individual dots printed in a line within the span of 1 inch (2.54 cm). The DPI value correlates with image resolution.
3. hard copy is a permanent reproduction, on the form of a physical object, of any media suitable for direct use such as paper.

More Terms associated with Printers (cont)

4. Page orientation is the way in which a rectangular page is focused on for normal viewing.

The two most common types of orientation are *portrait* and *landscape*.

A page in portrait orientation is taller than it is wide, with information printed across the shorter width of the paper.

A page in landscape orientation is wider than it is tall, with information printed across the widest part of the paper.

Audio Output Devices

Audio output devices are the components of the computer system that produce music, speech, or other sounds, such as beeps.

Common Audio Output Devices include:

Computer Speakers

PC Internal Speakers

Headphones and Earphones

1. Computer Speakers

Computer Speakers typically have tone and volume controls, allowing users to adjust settings.

To boost the low bass sounds, surround sound speaker systems also include a woofer, with one or two center speakers and two or more satellite speakers that are positioned so that sound emits from all directions.

Some Computer Speakers use Wireless technology.

2. PC internal Speakers

Most personal computers have a small internal speakers that basically output beeps and low-quality sound.

3. Headphones and 4. Earphones

In a crowded computer laboratory environment, speakers might not be applicable.

Instead, users can plug head-phones or earphones in a port on the sound card, in a speaker, or on the front of the system unit.

With the headphone or earphone, only the individual wearing the headset hears the sound from the computer.

Ear Phones & Headphones,

Other Output Devices

There are very many kinds of emerging output devices. Some are both input and output devices. Examples include:
Fax (or facsimile) machine
Interactive whiteboard.
Machine Tools.
LED displays.
Multifunction peripherals.

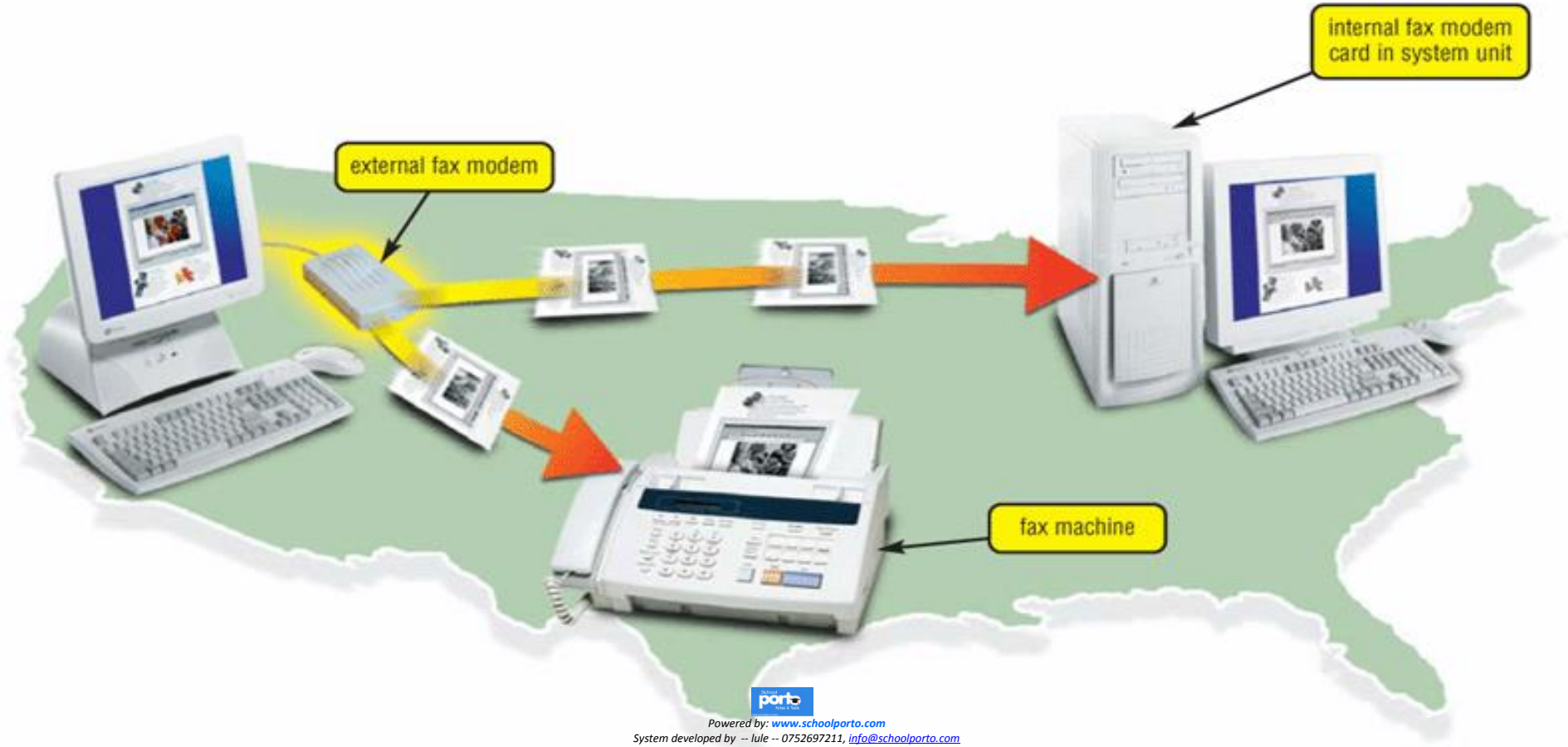
Fax (or facsimile) machine

A fax machine is a device that transmits and receives typed or hand written documents over telephone lines.

A stand alone fax machine scans the original document, converts the image into digitized data, and transmits the digitized image.

A fax machine at the receiving end reads the incoming data, converts the digitized data into an image, and prints or stores a copy of the original image.

Fax capability also can be added to a computer using an external fax modem.



Interactive whiteboard (IWB)

An interactive whiteboard is a touch-sensitive device, resembling a dry-erase board, that displays the image on a connected computer screen.

The presenter can use bare hands, a special tablet, or remote control to interact with the device.

Notes written on the interactive whiteboard can be saved directly on the computer.

Interactive whiteboards are used frequently in classrooms as a teaching tool.

Interactive whiteboard

Three basic technologies exist for displaying computer images on an interactive whiteboard:

- (1) front projection:

a separate projector displays an image from the computer screen on the interactive whiteboard;

- (2)rear projection:

a projector built into the back of interactive whiteboard displays an image from the computer screen on the whiteboard; and

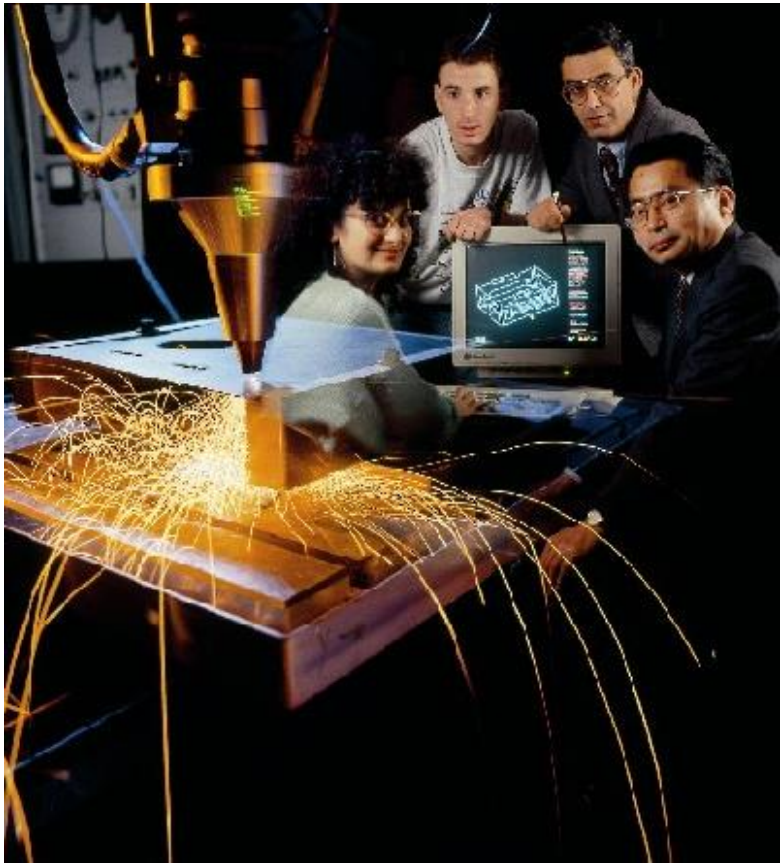
- (3) an interactive whiteboard fits over an LCD screen or a plasma display.

Machine Tools

A machine tool is a machine for shaping metal or other rigid materials, usually by cutting, boring, grinding, or shearing.

Through Computer-aided manufacturing (CAM) computers are used to control the output of machine tools and related machinery in the manufacturing of work pieces.

Machine Tools & CAM



Multifunction peripheral (MFP)

A multifunction peripheral (MFP) is a device that performs a variety of functions that would otherwise be carried out by separate peripheral devices.

As a rule, a multifunction peripheral includes at least two of the following:

- A printer
- A scanner
- A photocopier
- A fax machine

MFP

Merits and Demerits of MFPs

Advantages of a multifunction device are that

- it takes up less office space.
- it is significantly less expensive than if you purchased each device separately.

The major disadvantage of the machine is that if it breaks down you lose all functions.