# 1 Basic Computing Concepts (3) Output Devices

Output is the results of processing as presented in a user-language form. An output device is the mechanism that transmits such results to the user. The display screens (monitors), printers, plotters and synthesisers are all examples of output devices.

Screen displays

The most common screen displays used by computers today are based on the following technologies: CRT; LCD; LED; Plasma and 3D.

Screen displays 1: CRT Monitors

CRT is the abbreviation of cathode-ray tube, the technology used in (old) televisions and (old) computer display screens. A CRT works by moving an electron beam back and forth across the back of the screen. Each time the beam makes a pass across the screen, it lights up phosphor dots on the inside of the glass tube.
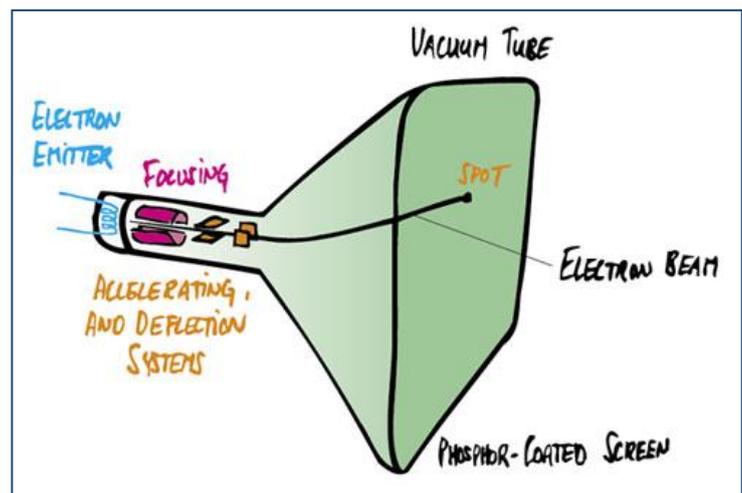
The CRT gave way to flat panels in the late 1990s. Flat panels take up less space, use less energy, emit less radiation and may be resistant to glare.

Screen displays 2: LCD Monitors

Short for Liquid Crystal Display, LCD technology can be found in digital watches and computer monitors. Colour LCD displays use two basic techniques for producing colour: Passive matrix is the less expensive of the two technologies. The other technology, called Thin Film Transistor (TFT) or active-matrix, produces colour images that are as sharp as traditional CRT displays.

Screen displays 3: Plasma Displays

Plasma displays are also flat screens but use a different technology than that used by LCDs.

Screen displays 4: LED Displays

LED is the abbreviation of Light Emitting Diode. The term LED TV is misleading because LED sets are simply a different type of LCD TV. Every LCD TV requires a source to illuminate its pixels, and in the so-called LED TVs, that source is a series of LEDs. In other LCD sets, the source is usually a series of fluorescent tubes.

Screen displays 4: 3D TVs

3D TV (and monitors) is an emerging technology that allows consumers to enjoy three-dimensional movies, television programs and video games in their homes. In the future there will not be the need to use glasses to watch 3D TVs.

Printers

In computers, a printer is a device that accepts text and graphic output from a computer and transfers the information to paper. Personal computer printers can be distinguished as impact or non-impact printers. The best-known non-impact printers are the inkjet printer and the laser printer. The four printer qualities of most interest to most users are:

- Colour: Colour printers are more expensive to operate since they use two ink cartridges (one colour and one black ink).

- Resolution: Printer resolution is usually measured in dots per inch (dpi). Most inexpensive printers provide sufficient resolution for most purposes at 600 dpi.

- Speed: If you do much printing, the speed of the printer becomes important. Inexpensive printers print only about 3 to 6 sheets per minute.

- Memory: Most printers come with a small amount of memory (for example, one megabyte) that can be expanded by the user.

Printer Languages

Printer languages are commands from the computer to the printer to tell the printer how to format the document being printed. These commands manage font size, graphics, compression of data sent to the printer, colour, etc. The two most popular printer languages are Postscript and Printer Control Language (PCL).
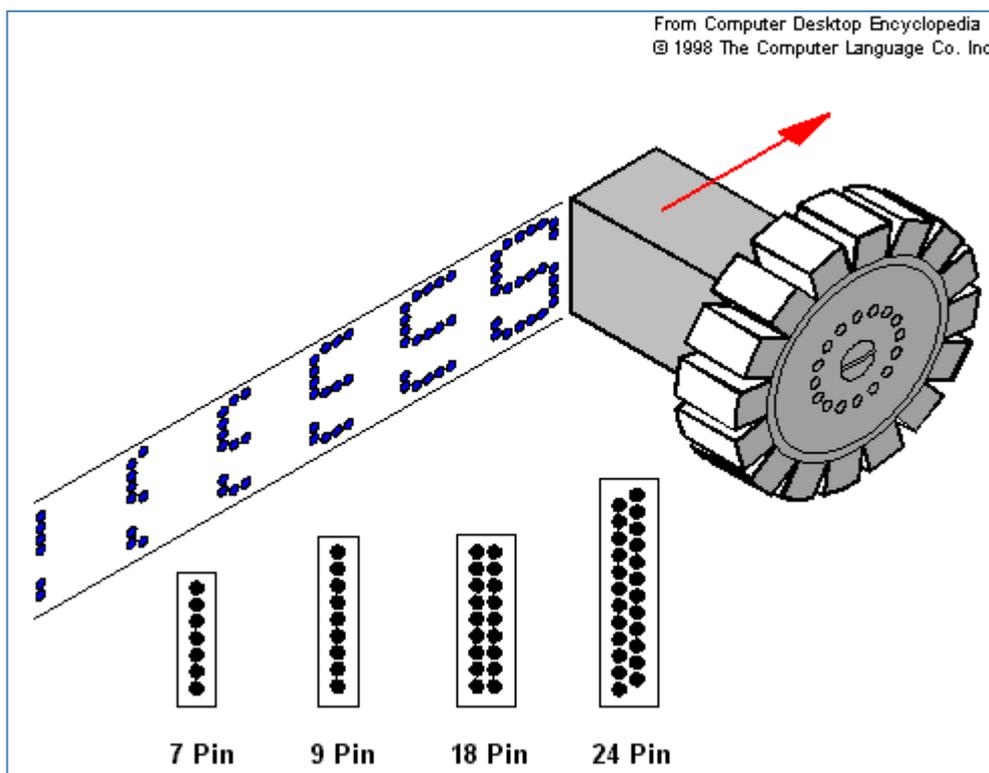
Fonts

A font is a set of characters of a specific style and size. Printers use 'resident fonts' and 'soft fonts' to print documents. Resident fonts are built into the hardware of a printer. They are also called 'internal fonts' or built-in fonts. All printers come with one or more resident fonts. Soft fonts are

installed onto the hard drive and then sent to the computer's memory when a document is printed that uses the particular soft font. Soft fonts can be purchased in stores or downloaded from the Internet.

Printers 1: Dot-Matrix Printer

This type of printer produces characters and illustrations by striking pins against an ink ribbon to print closely spaced dots in the appropriate shape. Dot-matrix printers do not produce high-quality output. However, they can print to multi-page forms (that is, carbon copies), something laser and ink-jet printers cannot do.

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7 Pin   9 Pin   18 Pin   24 Pin

They are almost not used any more with personal computers. They are impact printers (hammers strike the paper) and so they make noise while printing. Inkjet and laser printers are non-impact.

Printers 2: Thermal Printers

A thermal printer uses heat to transfer an impression onto paper. There are two kinds of thermal printers:

- Thermal wax transfer printer: a printer that fixes a wax-based ink onto paper.

- Direct thermal: a printer that prints the image by burning dots onto coated

paper when the paper passes over a line of heating elements.

Printer 3: Inkjet printer
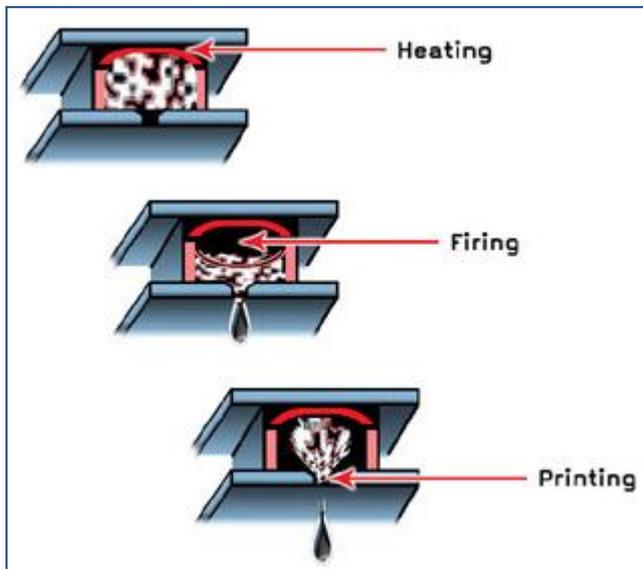
An inkjet printer is one that propels droplets of ink directly onto the medium. Today, almost all inkjet printers produce colour. Low-end inkjets use three ink colours (cyan, magenta and yellow), but produce a composite black that is often muddy. Four-color inkjets (CMYK) use black ink for pure black printing

The cost of ink cartridges for low-priced printers can make the less-expensive inkjet model more costly in the long run. For example, if the black ink does not come in a separate cartridge, you have to replace the entire four-color unit when you run out of black.

Printer 4: Laser printer

This kind of printer uses a laser to print a full page at a time. The laser "paints" a charged drum with light, to which toner is applied and then transferred onto paper.

Laser printer resolution is typically from 300 to 1200 dpi, but specialty printers can reach 2400 dpi. Options such as duplex printing (both sides) as well as collation (to collate means to rearrange sheets in proper sequence before binding), stapling and 3-hole punching may be available.

Low-end laser printers print in the 4 to 8 ppm (pages per minute) range, while typical office workgroup units print 17 to 32 ppm. Midrange units print in the 40-60 ppm range, with a large jump to high-end printers that print from 150 to more than 1,000 ppm.

Printer 5: Line printers

A line printer is a high-speed printer capable of printing an entire line at one time. A fast line printer can print as many as 3,000 lines per minute. The disadvantages of line printers are that they cannot print graphics, the print quality is low, and they are very noisy (impact printers).

Plotters

A plotter is a graphics printer that draws images with ink pens. It actually draws point-to-point lines directly from vector graphics files. The plotter was the first computer output device that could print graphics as well as accommodate full-size engineering and architectural drawings. Using different coloured pens, it was also able to print in colour long before inkjet printers became an alternative.

Pen plotters are still the most affordable printing device for CAD use and offer resolution unlike any other printer. The lines are not made up of dots. They are actually drawn, providing infinite resolution. There are a number of different types of plotters.

Speakers

A loudspeaker (or speaker) produces sound in response to an electrical audio signal input.

Individual drivers (mechanisms) are used to reproduce different frequency ranges. The drivers are named:

- Subwoofers (for very low frequencies)
- Woofers (low frequencies)
- Mid-range speakers (middle frequencies)
- Tweeters (high frequencies)
- Supertweeters (sometimes, highest audible frequencies)

Data Projector

This is a device that projects computer output. It is widely used in classrooms. A data projector shows a copy of what is viewed on a monitor.

Headphones

These are head-mounted speakers. Headphones have a strap that rests on top of the head, positioning a pair of speakers over both ears. For listening to music or monitoring live performances and audio tracks, both left and right channels are required.

Some variations of headphones include headsets (headphones and microphone) and earphones.