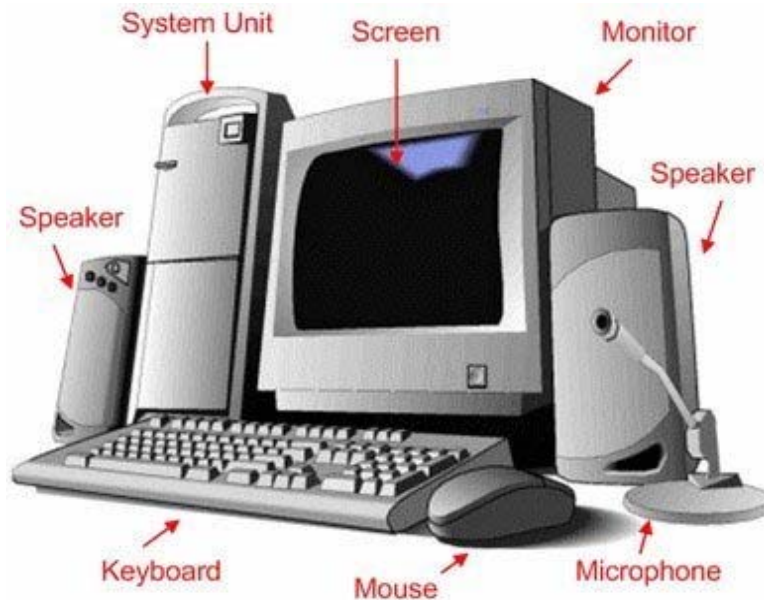


## 1.1 THE COMPONENTS OF A COMPUTER SYSTEM AND MODES OF USE

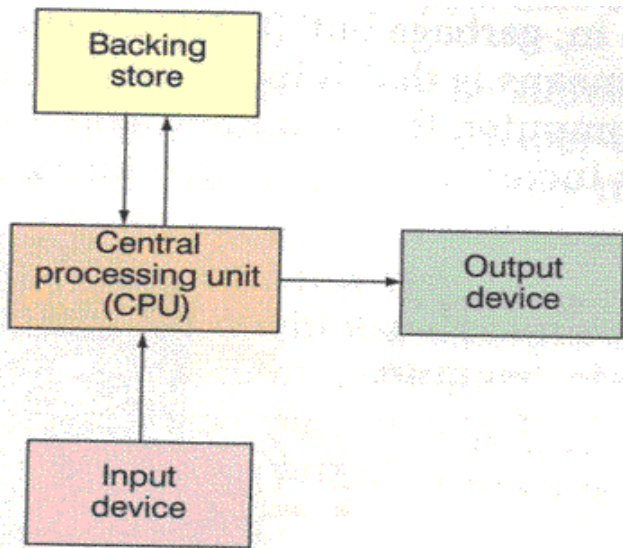
### Types of hardware

#### Hardware

- Is the collective name given to all the physical, mechanical, electronic devices that make up a computer system.
- Some examples of computer hardware are shown in figure below:



- Basically these devices may be split up into:
  - **INPUT DEVICES**: which are used to get the data into the computer.
  - **CPU (CENTRAL PROCESSING UNIT)**: - which is the brain of the computer.
  - **BACKING STORAGE**: - which consists of the disk drives used to store data when the power is switched off.
  - **OUTPUT DEVICES**: which include such units as printers and VDUs (visual display unit), which are used to provide output in the form of printouts, screen displays, etc.
- All devices external to the CPU and main memory are known as peripherals.
- A simple computer system is shown below:



- Below is a listing of different hardware devices in the computer and different methods of determining additional information about the hardware device.
  1. CD-ROM drive
  2. Floppy disk drive
  3. Hard disk drive
  4. Memory
  5. Modem
  6. Monitor
  7. \Motherboard
  8. \Network Card
  9. Printer
  10. Scanner
  11. Sound Card
  12. Video Card

## Electronic point of sale (EPOS)

### Definition

Self-contained, computerized equipment that performs all tasks of a store checkout counter. It allows payments by bank or credit cards, verifies transactions, provides sales reports, coordinates inventory data, and performs several other services normally provided by employees

Some hardware used at a EPOS include:

Input: Barcode reader

Output: Receipt printer

EFTPOS, *Electronic Funds Transfer Point of Sale*, refers to the technology that allows a retailer to directly debit a customer's bank account by using a [debit card](#). The debit card, generally the same as an ATM card, is swiped through a reading device just like a [credit card](#). The customer must enter his or her PIN number, generally requested once the amount of the sale has been entered into the EFTPOS device.

How EFTPOS works for stock control.

When goods are added to stock in the warehouse, its details are read using a barcode reader and added to stock.

At the time of sale, the barcodes are read again and reduced from the stock. Once the stock is below the required level, the user will be notified that stock is going low.

Other non-common input and output devices include:

**Graphics plotter:** it's used by designers, architects and artists to output very large printouts.

**Magnetic strip reader:** used to read data from cards like debit and credit cards.

**Optical mark reader:** used to read marks from paper. For example multiple answer questions that is ticked or shaded.

**Magnetic Ink Character Reader (MICR):** used to read special characters especially in cheques.

-**OCR** devices are particularly well suited to applications such as credit card billing systems where data such as customer account number and amount due is encoded by the computer on a **turnaround document** - that is, a document which is produced by the computer and sent to the customer, who returns the bottom tear - off slip with their payment.

-A clerk checks that the payment enclosed is the same as the payment due, and manually keys in the amount paid if it is different.

-The machine readable document is then input to the computer with no further keying required.

## SCANNERS

-**Scanners** come in a variety of shapes and sizes, from **bar-code** scanners which scan bar codes on labels in supermarkets or libraries, to hand-held and page scanners which scan a complete page, pixel by pixel.

-A scanner works by shining a bright light onto the image being scanned while the scan head moves from the top to the bottom of the document at an even rate. As it moves over each 'line' of the image, the scan head collects data by measuring the intensity of light that is reflected back from the document.

-Each scanned line therefore results in a stream of data which the scanner translates into digital information, with a certain number of bits representing each tiny area on the scanned picture. For a black-and-white image, only one bit will be required; for 256 shades of grey, 8 bits will be required.

-The resolution of the scanner is measured in dots per inch (dpi) along the x and y axes; the higher the resolution, the sharper the image, but the more memory it will occupy.

-With appropriate OCR software, scanned text can be turned into a form that the computer can process, making this an alternative to keyboard entry for long text documents, or for forms where hand-printed characters are written in specified boxes.

### **MAGNETIC INK CHARACTER RECOGNITION (MICR)**

-**MICR** is used mainly by banks for processing cheques. Special characters encoded along the bottom of a cheque are used to identify the bank number and the customer's account number.

-When the cheque is processed, the amount is also encoded by a bank operator, using a special ink containing ferric oxide which can be magnetised during processing.

-MICR has several advantages for cheque processing:

1. speed: over 1000 cheques per minute can be processed;
2. smudged cheques can still be read;
3. the characters are hard to forge.

### **OPTICAL MARK RECOGNITION (OMR)**

-An optical mark reader is a scanning device which can detect marks in preset positions on a special form.

-OMR is frequently used to score multiple-choice tests and for market research questionnaires.

### **MAGNETIC STRIPES AND SMART CARDS**

–Cards with magnetic stripes are widely used as charge cards, telephone cards, railway tickets etc. A bank card used for withdrawing cash from an automated teller machine (ATM), for example, will have encoded in the stripe:

1. the customer's account number;
2. the personal identification number (PIN) in encrypted form;
3. the bank's sort code;
4. the customer's withdrawal limit;
5. the amount withdrawn in the last time period (e.g. day)

–To use the ATM, the customer inserts the card and is then requested to enter the PIN, which is checked against the encrypted PIN on the card and the PIN held in the customer's record on the bank's computer.

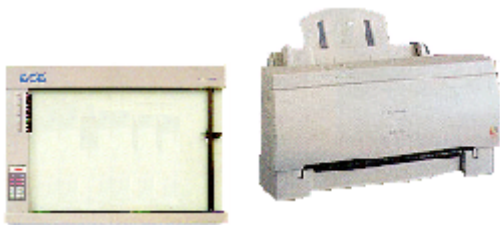
–The customer then presses a key to indicate the type of transaction desired, and if cash is required, types in the amount. This is checked against the account balance on the bank's computer and the information held on the card.

–A smart card can hold more information than a magnetic stripe card and contains a processing chip, making it extremely hard to forge or duplicate. They may eventually replace magnetic stripe cards.

## Output Devices

The purpose of the output devices is to translate data and information from electrical impulses to human-readable format.

The output device which is necessary for the computer to display messages to the user is a [monitor](#). If we want to keep the copy of the work on paper, we use [printers](#). [Plotters](#) are devices that are more suitable for the output of high quality graphics.



## VISUAL DISPLAY UNIT (VDU)

–A VDU has three basic attributes: size, colour and resolution. It has its own fixed amount of RAM associated with it to store the image being displayed on the screen, and

the amount of RAM it has will determine the resolution and the maximum number of colours that can be displayed.

## **PRINTER**

There are many different kinds of printer, including the following: -

### **1. Laser printer.**

– These printers give high-quality output are quiet in operation and relatively inexpensive to run, although they are fairly expensive to purchase. Major running costs include toner (powdered ink), occasional drum replacement and possibly a maintenance contract.

### **2. Inkjet printer.**

– These are inexpensive and can give good quality colour images. An inkjet printer would be a suitable choice for a school to purchase, for example for students projects, posters etc. The ink is expensive and special paper is required for best results.

### **3. Dot-matrix printer.**

– These are among the cheapest printers, and have the advantage that carbon copies can be produced, but the quality is not as good and they are noisy.

## **PLOTTER**

– Plotters are used to produce extremely accurate, high-quality drawings in, for example engineering or architectural applications. The two basic types of pen plotter are the drum plotter and the flatbed plotter, each of which have one or more pens that move over the surface of the paper under computer control to produce the drawing.

## **1.2. Types of Software**

### **Software**

- Is the general term for any program or set of instructions used to make a computer perform a task.

- Every processor, whether it is inside a mainframe computer, individual workstation or pocket camera, has to be given instructions in the form of a program before it can do anything at all.

### **Categories of Software:**

- 1) **General purpose applications software**
- 2) **Special purpose applications software**
- 3) **Programming languages, compilers and interpreters**
- 4) **Operating systems**
- 5) **Utility programs**

### **GENERAL PURPOSE APPLICATIONS SOFTWARE**

This category includes the common software packages that are found on most desktop computers most of which you will almost certainly use during your course. Examples:

- Word processing software (e.g. Word, WordPerfect) for producing and saving well laid out documents such as business letters, technical manuals, books, memos and reports.
- Desktop publishing software (e.g. PageMaker, Ventura, FrameMaker, PagePlus) for producing among other things like magazines, advertisements, newsletters and books.
- Spreadsheet Packages (e.g. MS Excel, Lotus 123, SuperCalc) for working with numbers, producing accounts and tabulated numerical information of all types.
- Database Packages (e.g. MS Access, Paradox, FoxPro) for information storage and retrieval. Databases are used in thousands of different applications from airline booking systems, mail order and invoicing systems to keeping tabs on distances flown racing pigeons.
- Graphics Packages (e.g. Paint, PaintBrush, CorelDraw) for producing artwork, 3 dimensional images, special textual effects.
- Computer-aided-design Packages (e.g. Turbo CAD, AutoCAD) for producing accurate engineering or architectural drawings.
- Multimedia Authoring Tools (e.g. Authorwave, Macromedia Director) which combine text, graphics, animation, sound and video for presentations, games, interactive tutorials etc.
- Telecommunications software (e.g. Internet Solution) which enables you to send and receive data over a wide area network via a modem, access the internet, send and receive electronic mail, browse the worldwide web.
- Expert Systems Software (e.g. Crystal, ELSIE) which can be programmed with the facts and rules about a certain 'domain' or field of knowledge such as

geological data around known oil fields The system can then be used to predict the likelihood of finding oil in a new location, given its geological profile.

## **SPECIAL PURPOSE APPLICATION SOFTWARE**

- When an organisation wants to computerise some aspect of its business, it is often possible to buy an 'off the shelf' package to do more or less exactly what it wants.

- There are literally thousands of specialist applications readily available to perform such tasks for example:

- keeping business accounts
- stock control
- payroll
- general practice management and appointments
- theater booking

- The alternative to buying one of these packages is either to buy a database package and build a customised application to suit your exact requirements; OR write a suite of programs using a language such as PASCAL or C to perform the required tasks.

## **PROGRAMMING LANGUAGES**

- All computers process instructions using machine code, which uses codes to represent basic operations such as load, move, add, subtract, compare and so on.
- Early programmers in 1940s and 1950s had to program using these numeric codes, a slow and tedious process.
- Later, programs were written which translated statements such as 'Add 1 to counter' into machine code so that programmers could write in something more closely resembling English, which was easier to learn, faster and quicker to debug.
- There are 100s of programming 'languages' and each of these languages comes with its own 'translation' program (one of two types: compilers and interpreter) which will take the code you write and turn it into machine executable form.
- Programmers who invent computer languages and write compilers or interpreters for them are called as system programmers.
- Bill Gates is the head of Microsoft who invented BASIC in 1971.

## **OPERATING SYSTEMS**

- While you are using a computer to write a program or do some word processing, the operating system is working away in the background, following instructions that determine where in memory your program or document is stored, where on disk it will be saved and what to do if for example you press <Ctrl><Break> to interrupt the execution of your program.
- No computer can operate without an operating system.



- The essential parts of the operating system are loaded from disk into memory as soon as you switch your computer on. Other parts of the operating system (such as some utility programs) will be copied into memory when required.
- MS-DOS (Microsoft Disk Operating System) is a character-based operating system.
- The user has to communicate with the operating system via a command interface, which means you have to know exactly what to type to get it to do what you want, like display a list of which files are in a particular directory on your disk.

## UTILITY PROGRAMS

- Utility programs perform common tasks such as formatting disks, copying and deleting files or repairing damaged files.
- Many utility programs are supplied with the operating system and can be called directly from it.
- Other utility programs can be purchased from a number of software manufacturers, such as

- PC Tools: a collection of utilities for PC system maintenance, management and protection.

- Dr Solomon's Anti-Virus Toolkit: a virus detection and protection system.

- After DarkScreenSaver: screen displays that appear when you leave the computer alone for a few minutes.

### Resources:

(1) Stephen D., [*Information Systems for you, 3rd. Edition*], Nelson Thornes Ltd., 2001.

(2) [<http://www.computerhope.com/index.htm>], Computer Hope (tm), 1998.