

Unit One

Concepts of Information Technology (IT)

1.1 General Concepts

Hardware, Software, Information Technology

Hardware is the physical components of your computer such as the system unit, mouse, keyboard, monitor etc.

Software is the collection of instructions that makes the computer work.

Information Technology (IT) is the use of computers as an aid in creating and maintaining data, i.e. information.

1.2 Types of Computer

mainframe computer, PC, networked computer, laptop, palmtop computers, Personal Digital Assistant (PDA)

Comparing computer types:

Mainframe

- **Capacity:** Very powerful computers often connected to many individual PCs over a network.
- **Speed:** Much faster than PCs used for processing large amounts of data such as mail-shots, salaries, tax etc.
- **Costs:** Very, very expensive, only affordable by large companies.
- **Typical Users:** Only used by large companies including banks, building societies etc.

PC

Capacity: Large hard disks combined with a work working memory (RAM)

Speed: Fast. Normally measured in GHz.

Costs: Getting cheaper by the day.

Typical Users: Home users, large and small offer users. Education, Doctors. In fact just about everyone needs to know how to operate a PC these days.

Networked PC

- **Capacity:** Large hard disks combined with a work working memory (RAM)
- **Speed:** Fast. Normally measured in GHz.
- **Costs:** A PC only requires an inexpensive card to be added to it to connect it to a network.
- **Typical Users:** Due to ease of networking a PC these days just about anyone can network PCs together.

Laptop

- **Capacity:** Large hard disks combined with a work working memory (RAM) – Often less powerful than for a PC of equivalent price.
- **Speed:** Fast. Normally measured in GHz. Often speed specifications are less than for a PC of equivalent price.
- **Costs:** Components need to be much more compact so there is a price overhead when compared to a PC of equivalent power.
- **Typical Users:** Business users, people on the move, educational users.

Palmtop

- **Capacity:** Much smaller storage capacity compared to a PC.
- **Speed:** Much less than a PC unless you pay a lot extra.
- **Costs:** In relative terms expensive when compares to a PC.
- **Typical Users:** Mostly business users.

PDA (Personal Digital Assistant)

- **Capacity:** Much smaller storage capacity compared to a PC.
- **Speed:** Much less than a PC unless you pay a lot extra.
- **Costs:** In relative terms expensive when compares to a PC.
- **Typical Users:** Mostly business users.



1.3 Hardware

The System Unit

The main PC box that houses the various elements that go together to make up the PC.



The System (Mother) Board

The system board houses the CPU, the hard disk and all the other electronic components.



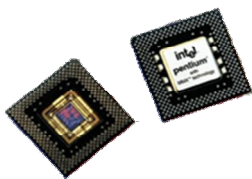
Central Processing Unit (CPU)

A microprocessor is the brain of the computer. It consists of :

- **Control unit** – Coordinates and controls all parts of the computer system
- **Arithmetic-logic unit** – Performs arithmetic or logical operations
- **Registers** – Temporarily store the most frequently used instructions and data

It determines how fast the computer will run and is measured by its Hz speed. Popular CPUs are made by companies : Intel, AMD, Cyrix.

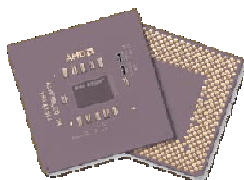
Pentium MMX



Pentium IV



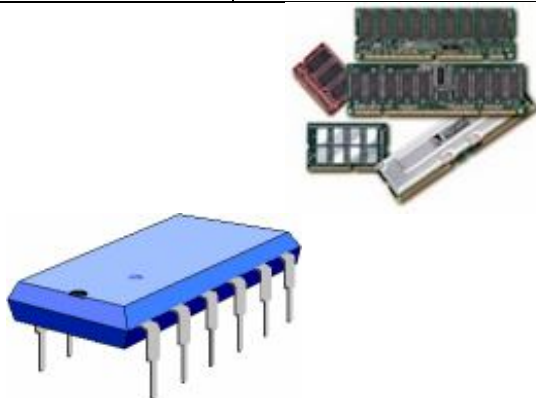
Pentium III



Memory

Program instructions and data are stored in memory chips for quick access by the CPU, there are two main types of memory : RAM and ROM.

| | RAM Random Access Memory | ROM Read Only Memory |
|-------------------|---|--|
| Function | Store the currently active programs and their data. | Stores certain fixed routines such as the boot-up routines. |
| Volatility | Volatile: When the computer is switched off, the contents are lost. | Non-volatile: When the computer is switched off, the contents are not lost |
| Changeable | Its contents can be changed or deleted. | Its contents cannot be changed or deleted. |



Memory Measurements

Bit (Binary digit) – On or off state; the basic unit of information; represented by 1s and 0s

Byte – Eight bits grouped together to represent a character (an alphabetical letter, a number, or a punctuation symbol).

Units of memory

| | | | |
|----|----------|------------------------------|-------------------------|
| KB | kilobyte | $2^{10} = 1\,024$ bytes | approx. 10^3 bytes |
| MB | Megabyte | $2^{20} = 1\,048\,576$ bytes | approx. 10^6 bytes |
| GB | Gigabyte | 2^{30} bytes | approx. 10^9 bytes |
| TB | Terabyte | 2^{40} bytes | approx. 10^{12} bytes |

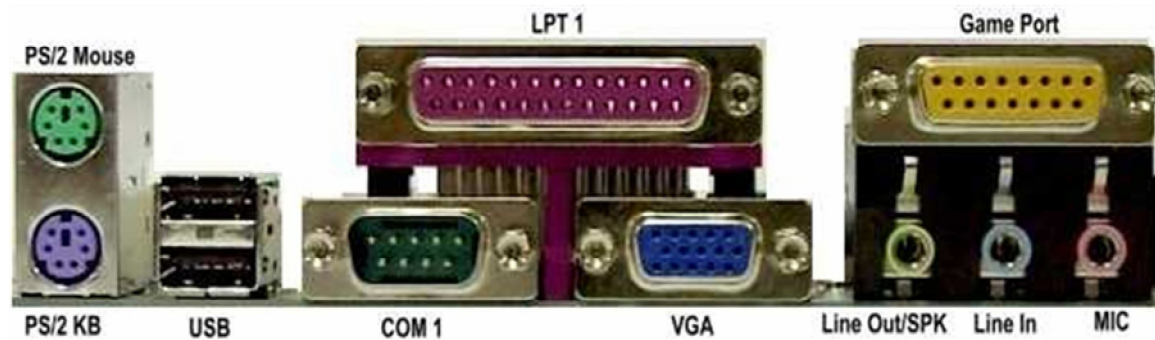
ASCII or American Standard Code for Information Interchange

A system of representing all the characters of the western alphabet and certain special characters in a single byte.

Peripheral devices and ports

A peripheral device is any device that is connected to the computer.

Types of Ports (Connectors):



PS/2 : used to connect devices such as mouse and keyboard

COM1 : Serial Port, used to connect devices such as modem.

LPT1: Parallel Port, used to connect devices such as printer.

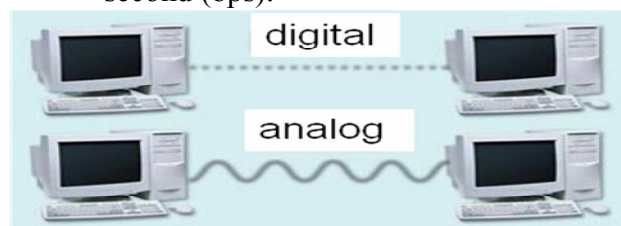
VGA: used to connect devices such as Monitor

USB : any device designed for USB such as scanners and digital cameras.

Modem

Signals can be:

- Analog – data is in continuous waveforms, measured in cycles per second (Hz).
- Digital – data is in discontinuous pulses (0's & 1's), measured in bits per second (bps).



A modem (MODulate/DEModulate) is a device that is used to transmit data over telephone lines.

- **Modulation** – converts digital (from computer) to analog to cross telephone lines
- **Demodulation** – converts analog (phone lines) to digital for computer



Input Devices

Input devices allow you to input information to the computer and include things such as the keyboard and mouse.

The Mouse

An Input device. the mouse is used to select drop down menus, to point and click on items, to select items and to drag and drop items from one place to another.



The Keyboard

An Input device. The keyboard allows you to type information into the computer.



Tracker Balls

Is an upside down mouse.



Scanners

A scanner is similar to a photocopier, except that instead of producing a paper copy of the document you place on it, you get an electronic copy which appears on your computer screen.



Touch Pads

A touch pad responds to pressure. Used with a special pen they can be used by graphic artists.



Light Pens

A light pen is used to allow users to point to areas on a screen and is often used to select menu choices.



Bar code reader

A bar code is a pattern of vertical lines in which the spacing and thickness can be used to represent data. A bar code reader is a device that can read and interpret bar codes and input the data into the computer.



Joysticks

Many games require a joystick for the proper playing of the game.



Voice input for PCs (microphones)

A microphone translates speech into an electronic signal. If you have a microphone and suitable software, you can record sounds.



Web Cams

You can now use a small digital movie camera (a Web cam) mounted on the PC monitor to allow two-way communication involving not just text communication but sound and video communication as well.



Digital Cameras

In a digital camera the images are stored digitally in memory within the camera. These pictures can easily be transferred to your computer. Currently they are limited by the quality of the image recorded and the number of pictures that you may store within the camera.



Output Devices

Output devices allow you to output information from the computer and include the printer and the monitor.

The VDU (Visual Display Unit), computer monitor or screen

The monitor is the screen that is used for outputting information in an understandable format for humans. They are supplied in different sizes, screen size is measured diagonally, common sizes range from 15" to 21" screens. There are two categories of screen: CRT and LCD.



More recently, flat screen computer monitors (LCDs) have become available, these take up a lot less room on a desk and use less energy than the traditional, more bulky CRTs.

Resolution: An important characteristic of all screens is their resolution. Each point of light on the screen is called a pixel. The resolution of a screen is the maximum number of pixels that the screen can display. For example, 800 x 600. The greater the resolution the better. Modern screens can display 1024 X 768 or better.

Computer presentation projection devices

Projection devices can be attached to computer and are useful for displaying presentations to a group of people.



Printers

Outputs a hard copy of the files and documents, printers speed is measured by ppm (page per minute), the quality is measured by dpi (dot per inch).

| | Dot matrix | Inkjet | Laser |
|------------------------------|-------------------|---------------|--------------|
| Initial cost | Low | Medium | High |
| Cost per printed page | Low | High | Medium |
| Speed | Low | Medium | High |
| High volumes | No | No | Yes |
| Noise level | High | Low | Low |
| Print quality | Low | Medium | High |
| Print graphics | No | Yes | Yes |
| Print source | Ink ribbon | Ink Toner | powder |



Plotters

A plotter is a printer, but normally allows you to print larger images. These are used in everything from the design of ships and machines to buildings.

Speakers

Many computers are now supplied with sound cards and speakers that mean that when you run 'multi-media' programs, you can listen to sounds that are played back via your computer.



Input/Output Devices

Some devices are both input and output devices. A modem can be used for download information from web sites and receiving emails. It can also be used for uploading and sending emails. A touch screen can display a menu system (output device), and accept input when people touch the menus displayed on the screen.

Storage Devices

Hard (Fixed) Disk

Hard disks are the main, large data storage area within your computer. Hard disks are used to store operating system, application programs and data.



What is the difference between internal and external hard disks?

Internal hard disks are located inside the main computer unit, while external hard disks are joined to the main computer by plugging it into the back of the computer unit. Internal hard disks are faster, bigger (higher capacity) and cheaper than the external hard disks.

Diskettes (floppy disks)

Their speed is very slow, hold relatively small amounts of data (1.44 Mbytes), very cheap.



Zip disk

A removable magnetic disk . It comes in a number of capacities: 100, 250 and 750 Mb. The speed of a zip drive is faster than diskettes. Its robustness and speed make it an excellent backup device.



Magnetic Tape

A tape very similar to the tape recorder, only much higher quality. These are used to record data (for backup), these tapes can store a vast amount of data at a low cost. It's the only storage device that considered to be a **sequential device**.



CD-ROM

a CD-ROM (Compact Disc - Read Only Memory). Much slower than hard disks. The advantage of a CD-ROM is that it can hold a vast amount of data around 650 Mbytes (equivalent to the storage capacity of over 450 floppy disks).

There are three types of CD ROM used for storage:

CD-W (Writeable) : can only be written to once. Once data has been written to part of the surface, this part can no longer be used.

CD-R (Recordable) allows you to record data, music or video to your own CDs.

CD-RW : are designed so that one set of data can overwrite another. This allows the disks to be re-used many times.



DVD (Digital Versatile Disc)

are similar to CD-ROM but contain vastly more information than a traditional CD-ROM disk. Much faster than CD-ROM drives but not as fast as hard disks. A double-sided DVD increases the storage capacity to 30 GB (or over 45 times the data storage capacity of a CD-ROM).



Flash memory

connects to the computer via the USB port It provides a very fast and reliable method of storing data externally.



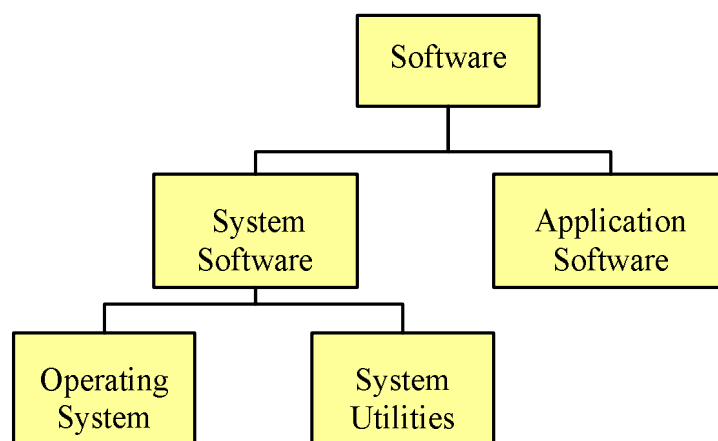
Computer performance

The performance of a computer is determined by a number of factors :

- **CPU:** The model of the CPU and its speed (measured in HZ).
- **RAM size:** the more memory you have the faster the PC will appear to operate.
- **Hard disk speed and storage:** Hard disk speed is defined by the disk access time, measured in milliseconds. The disk storage capacity is measured in Gigabytes (GBytes).
- **Graphics cards:** its the unit that converts the signals from the CPU into a form that can be displayed on the monitor. A good graphics card can take over many of the tasks of the CPU in generating the output.
- **De-fragmenting Files :** When you use a PC, over a period of time the files get broken up into separate pieces that are spread all over the hard disk. De-fragmentation means taking all the broken up pieces and joining them back together again.
- **Multitasking considerations :** The more programs that are running at the same time, the slower each one will run.

1.4 Software

Software is divided into two broad categories: **systems software** and **application Software**.



System Software

The programs that enable the computer to function, improve its performance and access the functionality of the hardware. Its subdivided into :

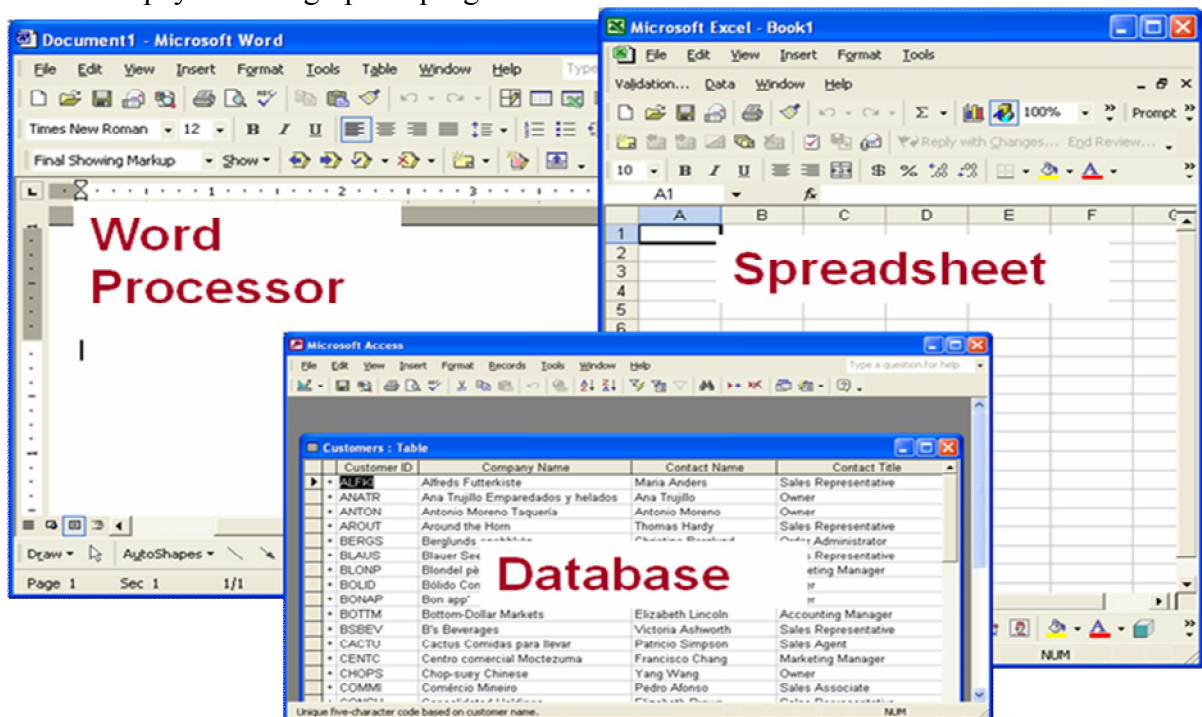
- **Operating System** : the set of programs that perform certain basic functions with a specific type of hardware.
- **System Utilities**. programs that helps and supports the operating system.

Some of popular operating systems :



Applications Software

The programs that enable the user to achieve specific objectives. Examples include word-processing programs, spreadsheets, databases, web browsing, presentation, accounts / payroll and graphics programs.



User Interface

Graphical user interface or GUI :

- Uses graphics to create a desktop environment
- Icons (small pictures) represent computer resources
- Programs run within on-screen windows

Examples of operating system that use a GUI include Windows and IBM's OS/2.

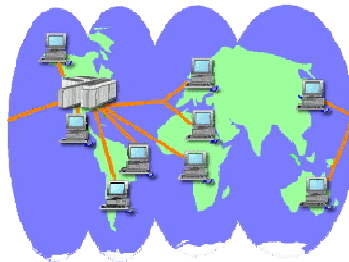
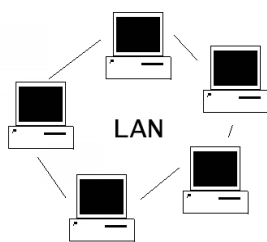
Command-Line Interface or CLI:

The user is required to type keywords or commands in order to enter data or give instructions. MS-DOS is an example of operating system that use a CLI.

1.5 Information Networks

LAN and WAN

- A LAN (Local Area Network) is individual PCs are connected together within a company or organization. In a similar way, other devices such as modems or scanners can be shared. The main benefit is to share information.
- A WAN (Wide Area Network) allows you to connect to other computers over a wider area (i.e. the whole world).



The World Wide Web (WWW) and the Internet

The internet is the collection of all computers across the world which can access each other in some way. The links between computers might include telephone, fibre optic cable, radio, microwave or satellite

The World Wide Web is just a small part of the Internet. The WWW is basically the text and pictures that you can view using your web browser.

1.6 The Use of IT in Everyday Life

Email allows you to send a message to another person almost instantly, anywhere in the world. It requires both computers to be connected to the Internet. As well as sending a text message, files can be sent as email attachments.



e-commerce is means buying or selling via the Internet.
e-banking relates to managing your money online.

1.7 Computer Viruses

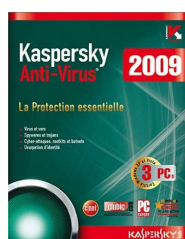


Viruses are small programs that hide themselves on your disks (both diskettes and hard disk). Viruses can spread from one computer to another, either via use of infected storage media, or over a computer network

Antivirus software protects the computer from computer viruses.

Some Types of Viruses

- **Trojan:** is a virus that hides itself inside another program. When the program is used, the virus is released and can begin its work of replication and annoyance or damage.
- **Worm:** A program that replicates itself over and over in the computer's memory until the computer can barely function. One of the signs of invasion by a worm is the slowness of computers.
- **Time bomb:** A virus activated when a certain date or time occurred. For instance, the famous Friday the 13th virus will activate only when it is both a Friday and the 13th of the month.



Anti-virus Precautions

- You should have an anti-virus program installed on your computer. This should be updated on a regular basis, so that the anti-virus program is aware of new viruses that are in circulation.
- Make sure that your virus checker is configured so that as well as scanning your computer for viruses when you first switch on your PC.
- **Take care when opening emails:** Be very cautious about opening unsolicited emails, especially if they contain file attachments.

- **Beware of Internet Downloads:** Any file that you download from the Internet may in theory contain a virus. Be especially careful about downloading program files (files with a file name extension of .COM or .EXE).

1.8 Copyright and the Law

Types of copyrighted software:

- **Commercial software** – Buy before using it
- **Shareware** – Try it before you buy it
- **Freeware** – Free software, but it can't be copied and/or sold

Public domain software is not copyrighted. There are no restrictions on using, copying, altering, or selling the software