INTERNATIONAL COMPUTER DRIVING LICENCE ã

MODULE I

Basic Concepts of IT

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GETTING STARTED

Before the Personal Computer

The first computers were physically so big that they needed a special environment for their operation. Even though they were large their performance was slow compared with modern computers. Some had no keyboards and screens and instead used punched cards or punched paper tape, which carried instructions that these computers would execute.

Highly specialised and trained operators were needed for the early computers and the cost of running these was very high, affordable only for very large organisations.

Evolution of computer technology came in various stages:

Stage 1	Electronic Tubes	Physically Large/Slow/Single Processing
Stage 2	Transistors	More Reliable/Faster/Multi Processing
Stage 3	Integrated Circuits	Desktop Size/Affordable Single Processor
Stage 4	Microchips	Current PC's/Very Fast/Multi Processing

These advancements in electronics enabled small lower cost computers to be mass-produced. These machines have high performance and are widely used in business and homes. These are the Personal Computers (PCs) launched in the 1980s, which became increasingly important in the 1990s.

Early PCs were used in stand-alone mode, and were unable to share files or peripherals. The 1990s saw the advent of networked PCs linked together to allow the sharing of information and resources such as printers and modems.

Extent of Use of the PC to date

Computers have revolutionised how the world operates. The Information Superhighway, enables people to use the Internet to:

- ♦ Exchange information

- ♦ Transfer files from one computer to another

- ♦ Download software

- ♦ Access available information on any subject

- ♦ Collaborate interactively

- ♦ Communicate instantly via chat sessions

- ♦ Shop online

- ♦ Participate in subject group discussions.

Electronic Office

The electronic office (Paperless office) is a concept meant to reduce to a minimum the amount of paper work kept in an office. Imagine how difficult it could be to search for a client's record which could have been mis-filed by the last user! Now, using a computerised database, information is just a mouse-click away.

Worse still, imagine losing all files by natural disaster such as fire or floods. Using a computer all information can have backups kept at a remote place and, if networked, information can be stored in another computer elsewhere.

Information can be transmitted more easily and faster by electronic mail, than by using telex or facsimile.

These days there is no need to travel to other countries for a conference because now one can sit in front of the computer and have a video conference with someone abroad, meetings can be conducted whilst in one's office, with huge savings on time and money.

So, as you can appreciate, computers are being used everywhere, that is in schools for administration and teaching, in banks, shops, companies, homes, agriculture, medicine etc. Knowing how to work with a computer then becomes a necessity.

Hardware / Software / Information Technology

WHAT IS HARDWARE?

This is the term given to the physical or tangible parts of a computer system. For example, keyboard, mouse, central processing unit, screen, printer and the speakers. These examples will be classified and explained in detail later in this module.

For computer equipment to be functional it also needs something that is not tangible. Hardware on its own is not functional, it needs software.

WHAT IS SOFTWARE?

Software is the term used for the programs that are used to give instructions to the computer and the information that is obtained from the computer. Examples of software are Windows 95, Windows 98, Microsoft Word, Microsoft Excel, Lotus 1-2-3, Word Perfect, Microsoft PowerPoint. Types of software will be discussed later in this module.

Software is not a "fixed" part of the computer but is loaded as and when needed. The immense versatility of the computer comes from the fact that the same computer can be used for many different applications, and this is achieved by loading different software for each requirement.

WHAT IS INFORMATION TECHNOLOGY?

Before going into detail with Information Technology (IT) it is necessary to briefly describe the terms "Data" and "Information". In simple terms we can say that data is a collection of raw facts.

Information is knowledge communicated or received concerning some circumstances. Data is processed to become information, which is meaningful to an end user and can help him to make decisions.

ASDL (ASYMMETRIC DIGITAL SUBSCRIBER LINE/ASYMMETRIC DIGITAL SUBSCRIBER LOOP)

This is a method of moving data over regular telephone lines in which the bandwidth available for downstream connection (receiving of data by a subscriber) is larger than for the sending (uploading).

This data-rate depends on the length and the quality of the line connecting the end-user to the telephone company. On average download data flow is between 1.5 to 9 (mbps) megabits per second while typical upstream data flow is between 16 to 640 (kbps) kilobits per second speeds average.

ADSL carries analogue voice, digital data and video.

Client-server Model

This is a system in which software is split between server tasks and client tasks. A client (user) sends requests to a server (according to a protocol to allow communication) for information or the performing of an action which the server responds to.

E-Commerce

It is important for us to realize that electronic commerce involves more than buying or selling online. It involves the entire online process of developing, marketing, selling, delivering, servicing and paying for products or services.

It has to be appreciated that paying online poses some challenges. For one, online customers cannot pay by cash or by cheque.

Electronic means have to be used. One is to use your credit card. However your information is vulnerable to interception by network sniffers, software that recognizes credit card formats. Hence most companies use security measures to counter this problem such as software that automatically encrypts data passing between your browser and the merchant server.

Advantages of Using E-commerce Include:

♦ Services are available 24 hours a day

♦ Variety of choice of goods as there will be competitors. This also results in one making a best buy in terms of quality and cost as well as the range of products to choose from.

♦ Transactions can take place anywhere and at any time.

♦ Transactions are completed quickly (once you have supplied your details. All you wait for is your delivery!)

Some Disadvantages of Online Shopping do Exist, such as:

♦ Risk of insecurity over payment methods. How secure will your credit card information be against hackers?

- Lack of the human element/contact
- Choosing goods from a virtual store

INFORMATION TECHNOLOGY

This is a term used to refer to the procedures and equipment used by people to improve the quality of gathering, processing, communicating and storing information.

Because we are now living in an information society where there is more and more information everyday, a mass of Information Technology has been produced. This includes radios, televisions, telex, telephone, fax machines, satellites and computers. It is also necessary to realise that a ballpoint pen and a book are examples of Information Technology.

With the development of new methods of communicating, storing and gathering information, this information is seen reaching almost every corner of the world in a faster way with more people accessing it.

Long ago people depended on smoke signals and drums to transmit and receive information over long distances but their use was affected by distance and geographical locations. Now with satellite and radio link technology everything is possible and information can be transmitted to remote areas. With IT there is less paperwork involved and retrieval of information is fast and easy. Storage of information has been enhanced, information can now be carried in a small diskette and retrieved when needed.

Types of Computer

WHAT IS A COMPUTER?

A computer is an electronic device capable of accepting data, processing it, giving it out and storing it for later use.

Taking into consideration the definition above, all computers regardless of their differences in size, capacity, speed, cost and number of users, have to perform four basic functions.
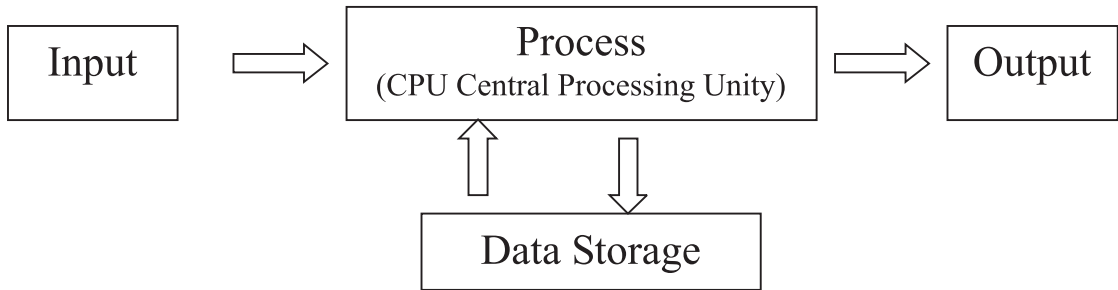
These are:

Acceptance of data

Processing of data

Giving out processed data and

Storing data.

BASIC ELEMENTS OF A COMPUTER

| Input | → | Process (CPU Central Processing Unity) | → | Output |

Data Storage

HOW MANY TYPES OF COMPUTERS ARE THERE?

Different authors have classified computers in many categories but this study guide will deal with Mainframe computers, Network computers, Personal computers (PC) Laptops and Personal Digital Assistants (PDAs). These computers will be classified roughly according to size, number of people who can use them at the same time, cost and the amount of processing power and speed.

Personal Digital Assistant (PDA)

Personal Digital Assistants or PDAs are the smallest most portable hand held computers currently on the market. They are small both in physical size and processing power and storage capacity. They are not as versatile as a PC but can usually be connected to a PC for information exchange.

The PDA group includes Pocket PC, Palm and Smart Phone. The technology of mobile telephones is converging with the palm computer technology, and allows Internet access from a mobile unit. The protocols used for this are termed WAP or wireless access protocols.

Two limitations on the versatility of the PDA are the size of the screen and keyboard. For those reasons they are usually designed for specific tasks. (though they are now full screen key-size keyboards as accessories for them)

Personal Computer (PC)

Also known as PCs, the Personal Computers, are the most important category in the field of computers for the end users. These are the most widely used of all types of computers. Main features of PC's are:

They are more versatile than PDAs

They are cheaper than the mainframes.

Only one person can use the microcomputer at a time and they are at times referred to as single-user systems.

They can be networked to support multiple users.

Some of these have a high processing power.

They are widely used in homes, schools and business.

They may be divided into two categories the desktop computers and namely the laptop computers. Desktop computers are designed for use in a fixed location while the laptop is designed for portability.

Laptop Computers/Notebook

Laptop computers have a screen inside the top flap and the keyboard on the bottom flap. They are designed for portability, using miniature electronic circuitry, so are generally more expensive than the desktop PC's.

New developments are palm or pocket computers. These can be connected to desktop or laptop computers to download or upload data files.

Sony PCG-FRV25 Notebook

WHAT ARE MAINFRAME COMPUTERS?

♦ Mainframes are the largest and most expensive computers, designed for large scale processing. Scientists and researchers use them for complex mathematical calculations. They are also used for control systems, an example being the computer system called Zimswitch. This connects Zimbabwe's banks, and allows countrywide use of the ATM (automated teller machine) network.

♦ More than 100 people can use it at the same time.

♦ They (cost millions of dollars) are generally more expensive than the other computer types

♦ They need a special environment

♦ They are now being used as network servers on the Internet.

WHAT ARE NETWORKED COMPUTERS?

Networked Computers are computers connected together so that they can share data and resources and support communication and file transfers between their users.

The smallest network consists of 2 computers connected to each other. However two computers that are connected for short periods to transfer data are not usually referred to as networked computers. The largest network is the World Wide Web. In a network of 3 or more PCs, one of the PCs will work as the File Server. On larger networks such as Zimswitch and the Web, mainframe computers do this job. See INFORMATION NETWORKS for more information.

HARDWARE

Central Processing Unit

WHAT DOES CPU STAND FOR?

CPU stands for Central Processing Unit. It is the 'box' that contains, among other things, the hard disk, CD ROM reader and diskette drives, and to which all peripherals (screen, keyboard, mouse etc.) are connected. It contains a functional unit (processor) that interprets and carries out instructions. It may be likened to the Central Nervous System of an animal.

An instruction is made up of operations that specify the function to be performed and operands that represent the data to be manipulated. For example if the instruction is to perform the operation of multiplying two numbers, there are two things that need to be taken into consideration that is:

♦ What the two numbers are, and

♦ Where the two numbers are.

The job of the central processor is to retrieve instructions and data from memory and to perform each operation.

Processor models were initially named in numbers for example 80286 or simply 286. Some examples of the processors are 386dx, 386sx, 486DX2, 486DX4, 586 or Pentium 1, Pentium II, Pentium III. We now also have the AMD K-6 Processors. The type of processor determines the speed and efficiency of the computer. Generally the higher the processor model number, the faster the processor.

PROCESSOR SPEED

The speed of the processor is measured in **Megahertz** (**MHz**) which means million cycles or instructions every second. The speed of the computer is actually given by the **Clock** of the computer which sends timed electrical signals every second and provides the processor's heartbeat.

A processor is made up of two functional units and a set of workspaces, that is, Control Unit, Arithmetic Logic Unit (ALU) and Registers.

THE CONTROL UNIT

The Control Unit is responsible for supervising the operations of the processor. It does the 'fetch and execute job', that is, retrieving instructions from memory and executing them accordingly.

The control unit is driven by a clock pulse. The rate of the clock directly affects the processor speed and it is measured in Megahertz (MHz).

THE ARITHMETIC LOGIC UNIT (ALU)

As the name states, it is responsible for all mathematical operations. It receives data from the Control Unit and performs either Arithmetic operations (add, subtract, multiply and divide) or Logic operations (making a comparison and taking an action based on the result) for example If A= 2 End, Else Begin. This example shows that if A is equal to 2 the program should end and if not equal to 2, it should start the operation again.

WHAT ARE REGISTERS?

Registers are storage locations inside the processor. Registers in the control unit are used to keep track of the overall status of the running program. Control unit registers keep current instructions and the operands of the instruction. There are also ALU registers that store data items that are to be added, subtracted, multiplied, divided or compared.

Input Devices

Input devices send data and instructions to the computers. There are many input devices but the most common ones are the keyboard and the mouse. This module will describe the following input devices.

Keyboard

Mouse

Trackball

Joystick

Light pen

Touch screen

Modem

Scanner

Microphone

Bar code reader

Digital camera

Video digitiser

Magnetic ink character recognition (MICR)

Magnetic strips or stripes

Storage devices can be used as input devices.

KEYBOARD

This is a human touch input device, which means it needs the human hand to press the keys when entering data. It mostly captures text data. There are four general areas of the keyboard. These are the function keys that are labelled from F1 to F12, the typewriter area in the QWERTY format; the numeric keypad located on the far right side of the keyboard and the cursor motion and control keys. To use the keyboard, just press and release the keys.
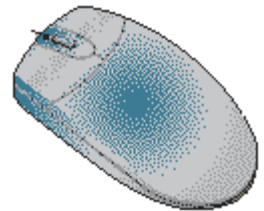
THE MOUSE

The mouse is used for all "point and click" operations.

It is a powerful device in today's graphical user interface type of programs.

The mouse translates the movement of the hand to the movement of an arrow, called the mouse pointer, on the screen. The mouse usually has a ball underneath which rolls when the mouse is moved, and this ball causes the two shafts to rotate. When the pointer is over an icon the mouse buttons can be clicked or double-clicked, or the mouse can be dragged to initiate an action.

TRACKBALL

A trackball is commonly used instead of a mouse on laptop and notebook computers. The main part of this device is a ball built into the keyboard. The ball has the same function as the ball built into the bottom of a mouse. When you turn the ball the pointer moves.

JOYSTICK

The cursor movement on the screen is controlled by a vertical stick (hence the name joystick). In some variations such as gamepads, cursor movement is controlled by the gadget's arrow buttons. An advantage it has over a mouse is that more functions are available on the joystick.

SCANNER

This is used to capture graphical or image data. There are two types of scanners, the hand and the table or flatbed scanner. When you want to copy a printed picture into the computer you need a scanner to capture it. The hand scanner is pulled over the image manually, whereas the table scanner is like a photocopier, and automatically pulls the sensors over the image.

LIGHT PEN

This is a device the size of a normal pen with a light at its end. The light pen is connected to the computer by a cord. The user touches the point of the light pen on the screen of a special pad then makes writing or drawing motions. This is mostly used by Artists and Designers.

TOUCH PAD

This also allows the user to sketch a design. It is a flat pad that the user can write on using a pen like structure known as a Stylus. All movements made on the pad by the stylus are translated into writing or drawings on the screen, because the pad is sensitive to the position of the stylus and the stylus is sensitive to the pressure applied by the user.

Most laptops that do not use a trackball, make use of a touchpad.

TOUCH SCREEN

This device works in a similar way to the light pen. Signals are sent whenever the user touches any position on the screen to execute a particular instruction. A finger or pen can be used as with map kiosks in shopping

centres and pen-based computers respectively. Touch screens are easy to use, because of this we call them user friendly. They usually found in public areas. Some ATMs use a touch screen.

MICROPHONE

A microphone is an input device that translates sound into electric current, which the computer will then digitise. Initially this was designed as a special device for the handicapped and required special software. However, more and more Voice-Recognition software is becoming available, allowing users to "speak" text rather than type it in. Voice Recognition applications usually have to be "trained" to understand different voices.

Microphones are also becoming increasingly important as Internet tools, and the Voice Over Internet Protocol is allowing verbal conversations and Voice Messaging across computer networks.

Computers that are equipped with a microphone, sound card and speakers can be used for telephone network switching, and this is becoming increasingly important in large call centres.

BAR CODE READER

This device works in a similar way to the hand-held scanner, but in this case it reads a series of bars, to identify an item or product. In shops it gives a fast and reliable service to both the salesperson and the customer. When the bar code is 'swiped' past the reader, the computer is able to identify the item and can look up the price in the shops data base. Bar code readers are also used in large warehouses and courier companies like DHL use them to track the movement of parcels.

DIGITAL CAMERA

This is a special device used to capture images in digital form. Instead of storing the image like a conventional camera on a film for subsequent chemical development, it stores the images on a floppy disk or in a computer chip. These are later downloaded onto a computer for editing and printing. The major advantage of digital pictures is that they can be attached to electronic mail, and hence press photographers on assignment in distant locations can send in their copy quickly and easily. The other advantages are that the floppy disk or chip is re-usable, whereas a normal photographic film is not.

It also has very powerful tools available for editing and enhancing digital pictures. The digital camera can also take short video clips that can be used for multimedia projects.

VIDEO DIGITISER

This is a special device used to display video signals from a video camera or video recorder in a window on the computer screen. Still images can also be captured. This is usually used by video editors because it allows the user to select the best part or images of a tape. Once the video sequences are on the screen they can be stored on to the hard disk as a video clip, but remember if not properly compressed they can take a lot of disk space.

MAGNETIC INK CHARACTER RECOGNITION (MICR)

This is mostly used by banks on bank cheques. The numbers printed at the bottom of the cheque have got magnetic particles on them. These can be easily and quickly read by a computer. This input device is very reliable since even if someone scribbles over the numbers with a pen, the data can still be read and entered into the computer for processing.

MAGNETIC STRIPS OR STRIPES

These are thin strips of magnetic tape found at the back of most credit or debit cards and on the key cards of some hotels. When the card is used, data is read and processed and information is displayed on the screen, for example, "Good morning J Banda". Almost everyone is using these cards each and everyday, if you have a bank card just check for the black strip, but don't scratch it.

The magnetic strips are used to withdraw money from cash dispenser machines popularly known, by abbreviation as ATMs (Automated Teller Machines).

Most magnetic strips are read-only and are used merely to identify the cardholder. However, some applications both read from and write to the magnetic strip.

Output Devices

These are devices that display or output work which has been done by the computer in a form readable to users. These include the following:

♦ Monitor

♦ Printer

♦ Plotters

♦ Speakers

♦ Actuators

MONITOR

This is also called the screen or the VDU; it is the main way of getting the processed data out of the computer. Monitors come in different shapes and sizes. The most common size is the 14-inch monitor and the size of the monitor is measured diagonally. Although they come in different capabilities in terms of colour output their function is still the same – to display information to the user.

The normal PC monitor uses a Cathode Ray Tube (CRT) which contains an electron gun. This shoots a stream of electrons onto a screen coated with a phosphorescent substance. There are control buttons on the monitor that the user can use to adjust the size, brightness and position of the display area. There is also a power button to turn the monitor on and off. There is a light next to the power button to indicate the status of the monitor, whether on or off.

You should note that switching off the monitor will not affect your information.

Whenever you shut down your computer remember also to switch off the monitor. The CPU can run continuously for days because it has got an in-built fan but the monitor needs to be switched off because of the absence of the in-built fan and it can become hot after some time.
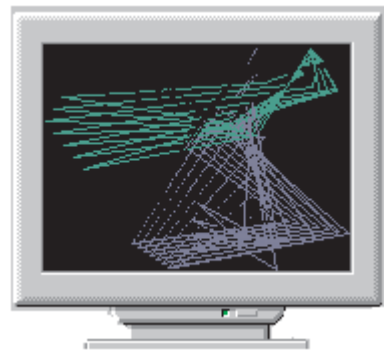
Exercise: Switch the Monitor Off and On

Press the monitor power button to switch it off the same way you turn off your television at home.

The light should go off and the screen become black, you have turned it off

Press the monitor power button to switch it on.

You should see the same information that was displayed before you switched off the monitor

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LIQUID CRYSTAL DISPLAYS (LCDS)

This is another type of screen that does not consume as much power as the normal PC monitor. They are used in notebook and laptop computers. Some digital watches and calculators also use this type of display.

LIGHT-EMITTING DIODES (LEDS)

These are small electronic components that emit light when a voltage is passed through them. They are 3 - 10mm in diameter. They normally display hard disk and network activities and are also used to monitor the logic state of some control applications, that is ON and OFF

PRINTERS

Printers produce 'hard copies' printed on permanent material. It is called hard copy because it is tangible and cannot be easily changed. There are two categories of printers, impact and non-impact printers.

The Dot matrix printer is an example of an impact printer because it uses tiny dots to produce letters and graphics. They make a lot of noise and are slow. Some examples of Dot matrix printers are the Epson LX300, Epson LX780 and the Citizen Prodot 24.

Ink Jet printers are an example of a non-impact printer since they use nozzles to spray characters on to the page. They are between the dot matrix and laser printers in terms of speed and quality. Some examples are Canon BJC 620, HP 610C, HP 590C, Epson Stylus Colour 300 and the HP 859Cix.

Laser Jet printers use the principle of a photocopier and use a laser beam to print characters onto a page. They are faster and more expensive. They are also an example of a non-impact printer. High quality text and graphics are produced. Some examples are HP LaserJet 1100, HP LaserJet 2100, HP LaserJet 4L, HP LaserJet 5L and the Epson EPL 5700.

Do the following activity after learning about the mouse and list the printers that are installed on your computer.

Exercise: List the Printers Installed in Your Computer

Click on the Start Button.

Point to Settings

Click on Printers

The printers window will appear with icons of installed printers

List the printers that are installed on your computer

PLOTTERS

Plotters are used in the scientific and engineering sectors for drawing building plans, machines and machine parts. Plotters can take A3 and A2 paper and come in different sizes and types. Some of them are as big as a small classroom!

Plotters use precision motors controlled by a computer. These motors move an arm across the paper in the 'X' direction and a pen unit up and down the arm in the 'Y' axis direction whilst an electromagnet lifts and drops the pen onto the paper, by so doing drawing or plotting an object according to instructions.

ACTUATORS

These are devices that can generate physical movements from signals sent by computers. These signals can be sent through wireless (remote) transmission or through cables. There are at least four types of actuators and these are:

Motors (produce the most accurate movement)

Hydraulics (use oil and are the most powerful)

Pneumatics (use gas and are the fastest)

Solenoids (their movement can be used to open gates/locks or to control the flow of gases and liquids in pipes)

Motors

These are driven by the output of the computer and this output is displayed by the turning of this motor. These motors are called stepper motors because each electrical impulse from the computer rotates the motor shaft by a very tiny amount such as 1.80. They give very precise movements and they are used on devices such as flatbed plotters or on robotic arms.

A robot arm can be controlled by motors, hydraulics or pneumatics. The type of the system used depends on the application.

SPEAKERS

Computers with sound cards are able to translate digital sound into audible signals via speakers.

STORAGE

Memory Storage Devices

Keeping information for later use is one of the most important tasks when one is operating a computer. It is therefore necessary that one understands the different types of storage devices. These devices store information and are part of secondary memory:

♦ Hard Disks

♦ Floppy Disks

♦ Data Cartridges

♦ CD-ROM

♦ Zip Disk

♦ Magnetic tapes

HARD DISK/ HARD DRIVE

The hard disk is the most common form of secondary storage. The hard disk is found in the Central Processing Unit, commonly known as the CPU and cannot be removed by the user. It is usually referred to as Drive C and, when partitioned, the other partition may be called drive D. Hard disks differ in size from 20Mb to 160GB. The common hard disk range these days start from 6.4 GB.

The hard disk holds the operating system, the basic software your computer requires for it to be functional. It will also hold other program applications such as your word processing programs. Data and information are stored magnetically on the surface of a flat circular plate that rotates at a very high speed of about 60 revolutions per minute. The hard disk also contains the disk heads which read and write information onto a disk.

They are a type of direct access storage device since each sector containing data can be addressed directly and, because of this, access is extremely fast. A PC may have more than one hard disk.

FLOPPY/STIFF DISKS

These are the removable part of secondary storage. They are used with floppy drives and there are two types of floppy disks, the 3.5-inch and the 5.25-inch. The 5.25-inch disk is virtually obsolete and new computers are being manufactured without this drive. The 3.5-inch diskette is more robust, physically smaller, and can hold more information than the 5.25-inch floppy. When both drives are present the 3.5-inch is usually called drive A and the 5.25-inch, Drive B. ***A drive is the unit into which the disk is inserted.***

Advantages of Floppy Diskettes

♦ They are cheaper than hard disks and CD-ROMs.

♦ They are portable hence used to transfer data or information from one computer to another.

♦ They offer direct access and they are faster than magnetic tapes.

Disadvantages of Floppy Diskettes

♦ They are prone to viruses

♦ They are difficult to handle

♦ They can easily be corrupted

♦ They have a relatively short life span

♦ They hold relatively small amounts of data

♦ They are not always 100% reliable.

Floppy Diskette Sizes

The table below shows the different types of floppy disks available

	Density	Size
3.5-inch	2S/2D	720Kb
	2S/HD	1.44MB
5.25-inch	2S/2D	360Kb
	2S/HD	1.2MB

The notations 2S/2D and 2S/HD stand for "double sided/double density" and "double-sided/high density" respectively. The 5.25 floppy disk is pretty much obsolete now. The 3.5 diskette is likely to follow the 5.25 diskette into obsolescence when CD writers become a standard part of new PCs as well as flash disks.

Care and Handling of a Floppy Diskette

- ♦ Don't put the diskette near any magnetic fields.

- ♦ Don't put the diskette near any electric motors.

- ♦ Don't expose the diskette to direct sunlight or heat.

- ♦ Store the diskette in a cool, dry, dust-free environment.

- ♦ Don't spill liquid onto the diskette.

- ♦ Don't use any diskette which has had liquids spilled on it.

- ♦ Don't bend or fold a diskette.

- ♦ Don't staple labels onto the diskette.

- ♦ Use a soft pencil or felt-tip pen when writing on diskette labels, as the pressure of a ballpoint may leave indentations on the magnetic surface.

- ♦ Don't touch the magnetic surface (the black plastic like plate) of the disk, as your fingerprints may hinder the drive in reading from and writing to the disk

Graphical Examples of Floppy Diskettes
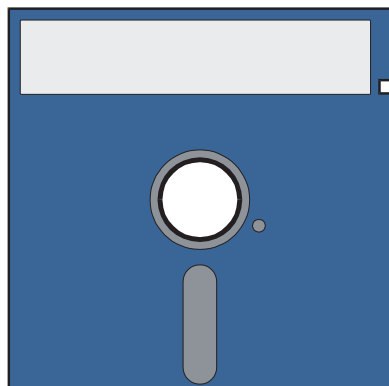
3.5-inch floppy disk
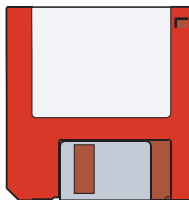
5.25-inch floppy disk

FLOPPY DISK WRITE PROTECTION

It is necessary to be able to prevent important floppy disks from being accidentally over-written. For example, the floppy disks containing drivers and programs should never be over-written.

The 5.25-inch floppy disk has a notch in the outer cover, which if **closed,** will prevent the disk from being over-written. Hence, sticking a write-protect label over this notch will not allow files to be written to the floppy disk. The 3.5-inch floppy disk has a plastic write-protect slider, which if **open,** will prevent the disk from being over-written.

FORMATTING DISK

Floppy Disks should be formatted periodically and before being used for the first time. The computer must keep track of where all the information is stored so it uses an index system. It is possible for the index to become corrupt and data to be lost. Diskettes can also be damaged (scratched). There are two ways to format a diskette, the "quick" and "full" formats. A quick format only erases the index so the data remains but cannot be accessed. A full format erases both the index and the data and checks the diskette for damage.

To format a diskette open Windows Explorer. Place the diskette in the drive and right click on the diskette icon. Select "format" then select the type of format required. Click OK.

(All disks must be formatted before they can be used for the first time. Hard disks are formatted before any software is loaded. Never try to format your hard disk because all information stored on it will be lost and your PC will stop working!)

MAGNETIC TAPES
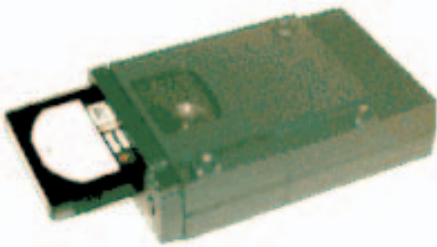
These are the same as those used by radios or tape recorders. Data or information is stored on a tape in a sequential way in blocks separated by interblock gaps. The tape drives have magnetic heads, which read or write information on to the tape as it moves. Usually the tape drive is external and is connected to the computer by a cable.

Advantages of Using Magnetic Tapes

♦ They are relatively cheap

♦ Used for back-up purposes and can take a copy of a hard disk

♦ They are reusable i.e. can be overwritten

♦ Can be used in any environment

♦ Easier to handle than multiple floppy disks when backing up large files

Disadvantages of Using Magnetic Tapes

♦ Data access is very slow since it is sequential.

♦ It is expensive to buy the tape drive.

DATA CARTRIDGES

Data cartridges are a special magnetic tape contained in a sealed cartridge, which is opened only when the cartridge is in the tape drive. These are more robust than magnetic tapes.

COMPACT DISKS

These are the common means of distributing software to PCs. They look exactly like the musical CD's that are played on your radio. They store large amounts of information up to 650MB (which is equivalent to 325 000 pages) in the form of text, sound, still pictures, animation and video clips. A laser beam reads the information. CDs can be found in four different forms, that is the CD-ROMs, CD-Rs, CD-RWs and finally the DVDs

CD-ROMs

These letters stand for **C**ompact **D**isk – **R**ead **O**nly **M**emory, which means you can only read but cannot change anything either by deleting or adding new information. Although it's a storage device it cannot be considered to be a backing store since the user cannot write onto it.

They are used to distribute programs, such as encyclopaedias, dictionaries, bibles, multimedia programs, educational programs and games.

CD-Rs

These are blank CDs that the user can write on, once only, using a CD writer which can be either external or internal.

CD-RWs

These are re-writable CDs which means the user can read and write many times as if using a hard disk.

DVDs

Digital Video Disks use the same principle as CD-ROMs but store more information. They store information on both sides and they can take up to 17 Gigabytes. DVDS are becoming widely used for distribution of films and video material. They first appeared in 1996 with the concept of Videos on CDs. To play DVDs you must have a DVD Drive or Player (which is also able to play CD-ROMs).

ZIP OR FLIP DISKS

These are like a floppy diskette but with an external zip drive. They are used for data back-up and can take up to 120 MB. Their advantage is that they can be disconnected and stored in a different site from the computer, so they are ideal for remote site back-ups.

Types of Memory

There are two types of Computer memory, namely Primary and Secondary Memory.

Primary Memory is also known as Internal Memory or Main Memory.

Secondary Memory is held on the hard disk and is used when there is insufficient Primary memory to hold all the data or instructions (programme).

Primary Memory, made up of semi-conductor memory chips, is found in the CPU on the motherboard. There are two types of Primary Memory, that is, RAM and ROM, with ROM having other versions such as PROM, EPROM and EAROM.

RANDOM ACCESS MEMORY (RAM)

This is the section of memory that is used to store data and programs currently in use and it is the memory that is immediately accessible to the user. Any area of this memory can be accessed very rapidly by the user, without the delays associated with input-output operations involving disk drives.

This type of memory enhances the speed of the computer. Most computers these days come with at least 32MB of RAM.

The computer cannot function without RAM. All data is transferred from the hard disk to RAM before being displayed on the screen, printed or altered. Every keystroke is stored in RAM before being displayed on the screen or stored on a hard disk. When you open a programme all the instructions the computer needs in order to run the programme are read into RAM.

In the interest of speed, the computer tries to keep the maximum amount of information in RAM. This explains why you lose data when there is a power failure. If for example you type a letter but do not save it to disk the computer can hold the whole letter in RAM.

Since RAM is volatile as soon as the power is turned off all the information in RAM is lost so when you switch on your PC again you have to retype the letter.

Features of RAM

- It holds the application programs and instructions in current use.
- Information in this memory can be read, written and changed.
- It is usually between 256 kilobytes and 512 Megabytes.
- It is the main part of primary memory.
- It is volatile

READ ONLY MEMORY (ROM)

This is memory that is 'hard coded' by the manufacturer during the time of manufacturing. It is a type of memory that the user can not change.

Features of ROM

- It is non-volatile and is used during start-up.
- It forms a small portion of the main memory
- It gives the CPU instructions during the start-up or booting process.

There are several subsets of ROM, which are:

♦ **PROM (for Programmable Read Only Memory).** This type of memory can be programmed by the user and the programmed data is held permanently once programmed.

♦ **EPROM (for Erasable Programmable Read Only Memory).** Just the same as the PROM but this has an advantage in that it can be erased and reprogrammed but for one to erase it, the EPROM must be removed from the computer.

♦ **EAROM (for Electrical Alterable Read Only Memory).** This type of memory can be erased, read and re-programmed without removing the chip from the computer.

Measuring Memory

HOW IS INFORMATION STORED IN THE COMPUTER?

Information is stored in the form of bytes. A byte is a unit of memory in a computer and this **byte** represents a **character** which can be letters, numbers and other punctuation marks. These bytes are formed from bits. Bits, or Binary Digits, may have one of two values. These are represented by 0 or 1, true or false, but will actually be the presence or absence of magnetisation.

WHAT IS THE RELATIONSHIP BETWEEN BITS, BYTES, KILOBYTES, MEGABYTES AND GIGABYTES?

A Bit is the smallest element of data storage. Bits grouped together form bytes. With the ASCII code, a combination of 8 bits form 1 byte. For example when you type a letter 'a' the computer will understand that as a combination of zeros and ones e.g. 01100001. The following indicates the relationship between different data units

8 bits = 1 byte (= 1 character)

1024 (2^{10}) bytes = 1 Kilobyte

1 048 576 (2^{20}) bytes = 1024 Kilobytes = 1 Megabyte

1 073 741 824 bytes = 1024 Megabytes = 1 Gigabyte.

For reasons of simplicity a Kilobyte can be been taken to mean one thousand bytes, a megabyte one million bytes and Gigabyte one billion bytes.

Characters are grouped together to form a word (field). An example could be having field names such as First name, Surname, Age and Residential address.

The field names discussed above can then contain detail on certain individuals. Each individual's information will then form a record.

A group of records can then be grouped together for storage or filing. This will then constitute a file. For example records can be collected together for people working for a certain company and then stored on the computer as the file ABC company.

Directories/folders are normally created to group a number of related files in one place. It could be that you are filing the records of a number of different companies. These can be organised together and stored in one area as a directory or folder. Refer to module 2 for detail on what folders or directories are.

Computer Performance

The performance of a computer in terms of processing speed is related to:

♦   Processor Chip type

♦   Primary Memory size, and

♦   Clock Pulse.

The amount of information a computer can hold is dependent on its Secondary Memory (Hard Disk) size.

Usually the efficiency of a computer is related to the Processor Chip, with more advanced chips giving improved performance. The early PC processor chips were known as 8086, 286, 386 and 486. These are all now obsolete, and have all been superseded by the Pentium chip. The Pentium chip is available in a range of different speeds; e.g. there is the Pentium 166 and Pentium 200. The Pentium 200 is faster than a Pentium 166.

It is also important that the computer has sufficient random access memory i.e. RAM. If there is adequate RAM, the computer can be fast if configured well, and will be able to run many programs concurrently without running out of memory. A good office computer should have at least 32MB of RAM.

Performance is also related to the speed of accessing the hard disk, for I-O (input output) operations. Hard disks come in different speeds, some IDEs are now faster, i.e. their rate of data transfer is greater. Improvements in hard disk technology have enabled the development of very large and very fast hard drives, at prices affordable for home and small office computing. However accessing the hard disk is still slower than accessing RAM and the size of the RAM determines how often the hard disk is accessed.

The combination of a modern Processor chip, sufficient RAM and adequate Hard Disk storage space will produce good performance.

However, it should be noted that an upgrade of the operating system or application software may degrade computer performance, as the general tendency is for each upgrade to require greater RAM and Hard Drive Resources.

Another factor affecting performance is the number of programmes or applications running at the same time. The amount of RAM available on any computer is limited and has to be shared between applications, the more programs loaded at one time the less RAM each programme has available.

SOFTWARE

Types of Software

Software is the collective noun describing the programs that are used to give instructions to the computer. The user will need a basic understanding of software concepts to be able to interact with the computer. Knowing a little about software types will help the user decide which program to use when solving a particular problem. For example when there is a need for financial analysis the user should know which software is best used for financial analysis.

There are two types of software namely System Software and Application Software. System software controls the operations of the computer, and application software performs user-required functions. For a computer to be functional it must have system software.

Operating System Software

System Software

The basic component of system software is an **Operating System**. It is the minimum software that the computer must have for it to be functional. An Operating System is a program that runs first when you switch on your computer and continues to run in the background. All other programs run under the control of an Operating System. Some have even referred to the Operating Systems as a Traffic Cop or Central Nervous System because of its functions.

The process of loading the Operating System is known as Booting, which is the process of switching on a computer. As electric power is detected the computer runs a program which fetches the Operating System from the HARD DISK and leaves it running in the computer memory to control all other programs. The user does not participate during this process if the Operating System is installed properly.

Examples of Operating Systems

>MS-DOS
>
>WINDOWS 95
>
>WINDOWS 98
>
>WINDOWS 98 SECOND EDITION
>
>WINDOWS NT WORKSTATION
>
>WINDOWS NT SERVER
>
>UNIX
>
>MACINTOSH

FUNCTIONS OF AN OPERATING SYSTEM

♦ It provides an interface between the user and the computer (this then means that the user should understand how the Operating System works before using other programs)

♦ It manages the flow of information in the computer.

♦ It directs information to the appropriate destinations. For example if you send anything for printing it is the duty of the Operating System to direct that information to the chosen printer.

♦ It keeps a record of the saved files, their names, sizes, location etc. This is why it is necessary to understand an operating system when we deal with managing files.

♦ It establishes relationships between hardware and software.

♦ It controls the running of other programs. Those who have used computer programs before will have encountered statements like "This program has performed an illegal operation and will be shut down". This is the job of the Operating System.

USER INTERFACE

The term User Interface refers to the way in which the computer presents itself to the user and the way the user will communicate or interact with the computer in terms of giving commands. It also determines how easily you will open a program. A good interface should have the following characteristics:

♦ It should be user friendly, allowing the user to do basic operations without having to first read the computer manual.

♦ It should be attractive so that it encourages the user to use it.

♦ And finally it should be effective and easy to use.

There are two types of User Interface. These are the Command Line Interface and the Graphical User Interface or GUI used with the newer operating systems.

COMMAND LINE INTERFACE

This is the oldest type of interface. It is the most complicated interface but is more powerful in some aspects. There is a lot of typing required to give instruction to the computer. Spelling and syntax need to be remembered, and entered accurately. One example of such an interface is MS-DOS. This is an early operating system, which requires the user to type in commands. It is difficult to use this before actually going in to detail with its manual. When you switch on the computer and after running the Operating System a command prompt line appears like the one below:

C:\>

To see a list of the files you need to type dir and press Enter on the prompt command line like this:

C:\> dir

Press Enter and a list of files and directories will be displayed.

The MS-DOS operating system uses the command line interface. The main disadvantage is that the user must know the commands, their spelling and syntax and when to use them.

GRAPHICAL USER INTERFACE OR GUI

This is the use of small picture-like structures to control the program. These picture-like structures, which are known as icons, represent a command, file, program or a folder. The control or communication is done by pointing the mouse and clicking on the appropriate icons. This is faster and easier than typing a command, and has the advantage that the user does not need to remember the spelling or syntax of the command to be executed.

The Windows programs are examples of such programs, using drop-down menus and icons.

Advantages of GUI

♦ There is no need to enter commands by typing, so it is faster, more reliable and there is no need to remember spelling or syntax.

♦ You use similar actions or procedures to do various different jobs.

♦ Almost all applications have the same appearance, that is, they contain caption bars, menu bars, tool bars and status bars in general.

Application Software

The programs that are designed to solve specific problems are referred to as Application Software. A wide range of programs have been created to deal with a wide range of problems. These programs are user-oriented whilst system software is computer-oriented. In this type of software we have different sub types such as, word processors, desktop publishing, database management, spreadsheets, graphics, multimedia and communications.

WORD PROCESSING SOFTWARE

These are programs designed to solve the problems of written work. They use the concept of a typewriter with memory. This type of software is used to produce written material such as letters, memos, reports, projects and books. Some of these programs have the ability to do desktop publishing work. Examples of these programs are Microsoft Word, Lotus WordPro, Amipro, Display Write, Wordpad and WordPerfect.

The main advantage of using a Word Processor is that the text can be changed on the screen and mistakes corrected until the document is perfect and it can then be printed.

The following can be done by a Word Processor.

♦ Formatting (choosing the way the document should look by changing line spacing, setting borders, inserting bullets for highlighting special points, columns etc.)

♦ Changing fonts (Styles of printing the letters or characters)

♦ Justifying (Align left, Centre, Align right and Justify across the width of the page).

♦ You can set up headers and footers, information which will appear on the top and bottom part of all pages in that document.

- Set up the page for either landscape or portrait print layout.

- Set margin widths.

- Grammar and spellings can be checked.

- Mail merging, whereby variable details from a data file are merged into the same standard letter. Necessary when one wants to send the same letter to different people.

For more information about Word Processing consult the ICDL Module 3 Study Guide.

DESKTOP PUBLISHING SOFTWARE (DTP)

This is software that is designed to produce work that includes graphics and text manipulation. It provides the facility to manipulate text and graphics easily. It also allows the user to change the orientation of text.

When you want to produce letterheads, business cards, anytime cards, posters, calendars, envelopes or greeting cards, use this type of software. Some examples are Print Artist, Microsoft Publisher, Instant Art, Announcement 4.0, Ventura Publisher, Page Maker, Frame Maker.

With a desktop publisher you can design your own material by positioning the text in desired positions, cropping images and you can also layer the objects.

Most modern printing presses will now accept material originated using desktop publishing software

DATABASE MANAGEMENT SOFTWARE (DBMS)

These are programs used to store, sort, search and retrieve information as easily as possible. A telephone directory is an example of a database because a database is simply a collection of information. Other examples of databases are customer information and student information. A database is made up of records and fields; records are in rows and fields in columns. Each record may contain more than one field. Examples of Database Management programs are Microsoft Access, FoxPro, FoxBASE, Dbase and Paradox.

With a database management program you can easily enter and sort data, retrieve information through queries and present the information in the form of reports, labels and tables. You can search for the information using condition statements, and the selected information can be printed.

For more information on Database management programs refer to the ICDL Module 5 Study Guide.

SPREADSHEET PROGRAMS

Also known as Financial Analysis programs, spreadsheets were designed to perform money calculations. These programs can be used to accumulate sales figures, calculate cash flow and expenses and profits, for home budget. Calculations are done at high speeds. They are used to calculate sums, averages, and other complex mathematical functions. A spreadsheet may be made up of several worksheets, each containing rows and columns. Where a row and column meet is what is known as a cell. Each cell is given a reference or address starting with the column and then the row. For example A1 means where column A meets with row 1. Columns are indicated by alphabetical letters and rows by numbers. Examples of Spreadsheet program are Microsoft Excel, Lotus 1-2-3, Quattro Pro and SuperCal.

It is recommended that you study the ICDL Module 4 Study Guide for a better understanding of Spreadsheet programs.

GRAPHICS AND PRESENTATION SOFTWARE

Software designed to add interest and clarity to reports and presentations. It can also be used to produce new art. With this type of software you can paint, produce three-dimensional images or add motion.

Some popular graphics programs are Adobe PhotoShop, MS-Paint, Microsoft PowerPoint, Harvard Graphics, TrueSpace, 3D Studio, Corel Draw.

MULTIMEDIA APPLICATIONS

Multimedia is a new technology that has been introduced in recent years. It is a technology that deals with the combination of text, graphics, sound, video and animation. This has been very useful in the fields of Education and Training. Most educational programs are multimedia programs. With a multimedia program the user can stop, pause, restart and replay at will. There are many programs including:

♦ Encyclopaedias such as Microsoft Encarta, EduSoft (Everyday Mathematics and English Discovery, The World of Nature.)

♦ Games like the Silent Steel

♦ Educational programs like Science Advantage 2000 (a Biology, Physics and Chemistry CD package)

Systems Development

System Development can be divided into two areas. The one is when an existing package or programme is chosen for a specific business application. The other kind of system development is when no ready-made package exists and new programme(s) must be written.

To develop a computer system from scratch is expensive and time consuming, so is not usually undertaken except by large companies and specialised computer companies. The following steps are given very briefly because this is a very specialised field and one that the reader of this manual is unlikely to become involved in.

♦ Analysis – This is the first step when the problem is examined and defined. It is the Analysts job to decide what data has to be stored for manipulation and the best way for a computer to be used. In other words the Analyst analyses the problem and designs the computer system.

♦ Programming – the Programmer writes the programmes according to the Analysts instructions. It could be said that the programmer translates the instructions from something you and I can understand into something that the computer can understand.

♦ Once the programs have been written they must be tested. Without testing no one can be sure that the programmer has done the translating correctly or that the analyst hasn't overlooked something.

♦ Implementation – the final step. The programs are ready for use with 'live' data. Implementation also involves training of the user etc. as detailed below.

It should be remembered that the quality of the above product depends on the abilities of the people involved and the available time. Even the best team cannot think of every possibility. Although the product is tested before being used in a live environment the real test comes with the live data and errors and omissions will be found. In addition the users needs change with time. Therefore computer programs need constant updating or maintenance.

Operating systems (e.g. Windows) and programs (e.g. Excel) also need updating to take advantage of technological advances. Each upgrade of computer software is given a version number to allow both the supplier and user to keep track of the changes. Often when a suite of programs is completely revised a new name is used (e.g. Windows 3.1, Windows 98, Windows 2000.) As far as possible the latest version should be used but this is not always possible without upgrading the hardware. (Windows 2000 cannot be run on a 486 or a small Pentium PC due to the memory deficiency of these machines).

Developing a system or deciding on the best available software for a company's needs may be described as follows. The System Development involves the chain of events from the inception of the idea of using a computer to the successful running of the computer system. The life cycle of a computer system is dependent on how useful or successful it is, and on the developments in the technologies used. Generally, system development costs should be amortised over 3 to 5 years, and the system reviewed after that period.

System Development includes the following phases:

Initiation	Recognition of the problem and establishment of project objectives, boundaries and terms of reference
Feasibility Study	Examination of feasibility of alternative solutions, and decision as to which is most appropriate
Hardware and Software Selection	Choosing what hardware and software is best suited to solve the current problem, and allow for future expansion
Cost Justification	Quantifying costs and benefits
Hardware and Software Purchase	Purchasing and installation of the necessary equipment and software, and testing that it is functional
Training	Training of staff as required
Initial Data Take-on	Conversion of existing data, and/or capture of master file records to run the application

Testing	Testing that the system produces results as required. With major projects this may involve pilot schemes or parallel operations
Procedures Development	Development of the manual procedures that are required to ensure the correct flow of data into the system, and information out of the system. These will include the system security and back-up procedures
Implementation	Switch over to live running

New software is continuously being developed to accommodate new user requirements, and older software is being improved, so the project may involve upgrading or improvements of existing systems.

INFORMATION NETWORKS

WHAT IS A NETWORK?

Networking is the linking together of computers either by wire cables, fibre optic cables, microwave links or satellite. The networking of computers introduced in the mid 1980s allowed users to link PCs on their desks together via cables and a special network Operating System.

WHAT ARE THE ADVANTAGES OF USING A NETWORK?

Networking allows computers to share files and programs, use a common printer or modems and share the Internet connection as well. People can also communicate instantly over a network using programs such as Winchat or Microsoft NetMeeting.

HOW MANY TYPES OF NETWORKS ARE THERE?

There are two basic types of networks, LAN and WAN.

LAN and WAN

LAN

LAN means Local Area Network. This is a network which only connects together computers in the same building for example an office or a house. Each computer on a network is called a workstation or terminal. If the workstation has processing ability it is known as an Intelligent Terminal and if it does not have processing power it is known as a Dumb Terminal. Most dumb terminals have a screen and a keyboard only.

WAN

With the advancement of telephone communication technology, WANs were developed for Wide Area Networks, which connect computers in different geographical locations. For example computers in a Harare office connected to the organisation's Bulawayo offices. Two or more LANs can be connected together to form a Wide Area Network.

The wiring needed for both a WAN and a LAN to function is installed and used specifically for that purpose.

WHAT DO YOU NEED TO HAVE A NETWORK?

A computer with a network card, commonly known as an Ethernet adapter, is needed and:

♦ A Computer (file) server with a network operating system e.g. Windows NT Server or Windows 98 SE.

♦ A Hub is needed and this is the most important part of the network. The hub brings all the PCs together and provides a single connection to a network server or another hub.

♦ For a WAN network, a Modem is also necessary.

♦ Fibre optic cables to connect the PCs to the Hub.

The Telephone Network in Computing

This is the use of telephone lines to interconnect computers and other devices that work with computer coded data, so that data can be transferred from one location to another. The reasons for interconnection of these computers via telephone lines are:

♦ To have access to information

♦ For the operation of electronic data transmission which is a faster way of communicating

♦ To extend the world's telecommunication services.

♦ To help business to take place in faster ways, like money transfers and banking.

For a computer to be able to communicate via the telephone system, another device is needed which understands both the languages of the computer and of the telephone. This device is known as the Modem.

Along with telephone networking there are other systems or technologies that have emerged for the same function, that is digital data transmission. For this we have to understand terms like PSDN which means Public Switched Data Networks, ISDN (Integrated Service Digital Network), Satellite Communications, Fax, Modem, Digital, Analogue and Baud.

PUBLIC SWITCHED DATA NETWORKS (PSDN)

This is an example of a packet-switched network, a network which is used especially for Electronic Funds Transfer and also ATMs (Automatic Teller Machines) which are machines at banks and building societies which provide cash for withdrawals, deposits, account balance enquiries and payment of bills. These ATMs or cashpoint machines communicate with the banks' central computers.

INTEGRATED SERVICES DIGITAL NETWORK (ISDN)

ISDN is a technology of data transmission that combines voice, data, video and other signals. With this technology people can talk to each other by telephone and use the same line to send data between their computers. Meetings can be held with people at different places whist seeing each other through video screens and this is known as videoconferencing. ISDN lines are now being installed in homes, schools and businesses. They are high-speed lines that can transmit at a very high speed, but they need a special modem. Their transmissions are more error free than ordinary telephone lines.

INTRANET

An Intranet uses the existing telephone network (e.g. PABX) and works like a private Internet. It is any network of interconnected computers belonging to one organization, similar to but separate from or insulated from the Internet. Intranets use the same protocols and software that are used on the Internet. For instance, many organizations have special intranet web sites that can only be viewed from a desktop in their offices, or when connected to their Virtual Private Network (VPN).

EXTRANET

An extranet is a private network that uses the Internet protocol and the public telecommunication system to securely share part of a business's information or operations with suppliers, vendors, partners, customers, or other businesses. An extranet can be viewed as part of a company's intranet that is extended to users outside the company. An extranet requires a high level of security including digital certificates and encryption of messages, so that the company that owns the extranet can limit access.

Extranets have many uses for example to share product catalogs exclusively with their distributors, provide or access services provided by one company to a group of other companies, share news of common interest exclusively with partner companies

WHAT IS SATELLITE COMMUNICATIONS?

This is the transmission of data, voice and video through microwaves. No cabling is required on satellite communication; it is the most powerful means of communication and provides broadband communication channels. The transmission rate is measured in Megabytes per second. Orbital satellites act as repeaters or relay stations in a communication link. They also receive signals which can originate from a phone line and re-send an amplified signal to the receiver.

Advantages of Satellite Communications?

- There is less limitation as to the origin and destination of a transmission, which can originate from any point and be received at any point within the coverage of the satellite.
- There are no obstructions, and transmission is not subject to the terrain problems faced by landlines.
- High bandwidth of several Megabytes per second can be enjoyed.
- Thousands of people can simultaneously talk through telephones using a single satellite.
- There is no sea or ocean to hinder satellite transmission and distance is not significant.
- The cost of providing satellite communications does not depend on distance.
- They can reach every corner of the world, even the most remote areas.

Although there are some disadvantages, these are insignificant compared to the advantages offered by satellite communications.

WHAT IS FAX?

This is a technique used for transmitting text and black and white pictures over the telephone in digital form, by scanning at the transmitter and printing at the receiver.

The receiver receives a facsimile printed copy.

WHAT IS A MODEM?

The term modem means Modulator-Demodulator. It is a device that translates digital signals to analogue and visa versa. It modulates a transmitted signal and demodulates a received signal at a data station. This means that it understands both the languages of the computer and the telephone. It is connected between the telephone and the computer. It acts then as the go-between in establishing a communication relationship between a computer and the phone. For example a digital signal from a computer is converted into an analogue signal for transmission over the telephone system and converts received signals back to digital form at the receiving end. Note that a modem is necessary at each end of a communication link. The modem is necessary for electronic mail and the Internet.

WHAT DO THE WORDS DIGITAL, ANALOGUE AND BAUD MEAN?

Digital is the representation of data or physical quantities by means of digits. Digital quantity is discontinuous and it goes step by step in other words in the form of a pulse.

Analogue is a signal that is continuous. It can take any value in a continuous form within a specified range.

Baud Rate

This is the speed at which modems transmit data, i.e. sending and receiving. The baud rate is measured by the number of bits per second that are transmitted. Modems now go as fast as 56Kb per second.

Electronic Mail

This is the transmission of written messages by electronic means via a computer network. Messages can be sent locally or worldwide. Each user of the e-mail has a mailbox address to which messages are sent. Messages sent through e-mail may take only a few minutes to arrive.

Pictures, documents and sound files can be sent through e-mail as attachments. These files are referred to as MIME attachments. MIME stands for Multimedia Internet Mail Extension and was developed to help e-mail software to handle a variety of file types.

A user can type a message using Word Processing Software and transfer the message to a communication software package, or can simply type the message directly in a window displayed by the communication software.

There are two types of e-mail accounts, there is the computer server based e-mail account and the web based e-mail account. With a computer based account there is an initial configuration needed to receive mail from a Service provider. Once configured and the user has the required equipment one can send and receive mail for the cost of a local telephone call.

Most web-based accounts are free, and one can access the mail anywhere, at any time, as long as the computer is connected to the Internet. You can get a free e-mail address from the following web sites:

www.yahoo.com

www.doramail.com

www.hotmail.com

www.ireland.com

WHAT DOES ONE NEED TO SEND AND RECEIVE E-MAIL?

For one to send and receive mail you need to be connected. This simply means you must have an e-mail address and a computer that is capable of being connected to the Internet. For one to connect to the Internet, you must have an account with an ISP (Internet Service Provider). Your computer must have a modem connected to a telephone line.

The following are examples of e-mail addresses:

jbanda@zarnet.ac.zw

bandaj@avu.org

wldgwe@internet.co.zw

WHAT ARE THE BENEFITS OF ELECTRONIC MAIL?

♦   Savings in postage and telephone costs since one is charged at local call rates when sending and receiving e-mail.

♦   It is very fast and allows multiple addressing. The same letter can be sent to several different people at the same time.

♦   The recipient does not have to be present to receive mail. Messages are stored at the ISP and can be retrieved at any convenient time.

- One can join list servers and news groups and receive updated information on a particular subject.

- One can enjoy e-mail discussions through e-groups.

- It is paperless.

Some examples of E-mail programs include Eudora, Microsoft Outlook Express, Microsoft Outlook 2000 and Netscape Messenger.

For a better understanding please consult the ICDL Module 7 Study Guide which deals with Internet and e-mail.

The Internet

This is a huge international network made up of smaller networks that are linked together like a spider web. The Internet started as an application for self-healing of computers in the US government in case of nuclear disaster. It later spread to the academic researchers for exchange of ideas and study material. Now the Internet has taken the world by storm. Information on almost anything can now be found on the Internet.

There is one important aspect to consider, there is the Internet and there is also the World Wide Web (WWW). These concepts are different although people use them interchangeably. The difference is that the Internet is the term referring to the physical connection of the world-wide network whilst the World Wide Web holds all the information which moves around the Internet.

WHAT IS NEEDED FOR ACCESS TO THE INTERNET?

All you need is:

- A computer

- Phone line

- Modem or an ISDN connection

- An account with an Internet Service Provider

- An Internet browser program (the two main browsers are Internet Explorer and Netscape Navigator)

WHAT CAN I FIND ON THE INTERNET?

There is almost everything on the Internet. The Internet can offer you the following just to mention a few:

♦ Electronic Mail. This is fast and efficient, and no matter where you are, with access to a computer, you can still get in touch with others.

♦ File Transfer. You can enjoy sharing of files through FTP (File Transfer Protocol)

♦ Current Information. You can use search engines to get information on almost any subject.

♦ Discussion Groups. You can join discussion groups on any topic of interest.

♦ Virtual Classroom. You can be part of the virtual classroom and gain the benefit of expert lecturers, who can reach many more students than could fit into a conventional physical classroom. If you have a question on a particular subject, you can contact web mentors or experts in your field and they will be able to help.

♦ Downloads. Teachers can get lesson plans and past exam papers on the Internet.

♦ Collaborative Learning. You can share ideas and learn with others virtually.

♦ Entertainment. It is easy to listen to a radio station on the Internet via real-time broadcasting. It is also possible to play on-line games and compete with strangers.

♦ Breaking News. Why buy a newspaper when you can read it on the Internet, just type in the website address.

♦ On-line Shopping opportunities. You can buy whilst at home.

♦ Chat Sessions. You can talk to someone abroad instantly by typing and sending messages.

WHAT ARE SEARCH ENGINES?

These are web sites that enable users to query an index and then return results relevant to the query. You can search by typing the concept, keyword, site and/or links. After searching the search engine will display the results and the user can select the appropriate site.

Most popular search engines are AltaVista, Direct Hit, Excite, GO.com, Google, HotBot, Northern light (www.nlsearch.com) ProFusion, Inference (www.infind.com)

ELECTRONIC PUBLISHING

Whilst books and printed materials will never disappear, there are substantial benefits to electronic publishing. This is the production of material on electronic media, which can be distributed either via CD-ROM or via electronic mail or the Internet. The material can include text, graphics, sound and even video images.

The Benefits of Electronic Publishing are:

♦ Decreased origination costs. There will be no change in the cost of collection and editing the material for publishing, but software tools available for origination have greatly reduced origination costs

♦ Low production costs. Creation of a CD-ROM from a master copy is significantly less expensive than printing

♦ Low distribution costs. Newspapers, journals and magazines which relied on conventional postage and physical delivery to reach their readers can now be published on the Internet, and reach the readers immediately after publication

♦ Reduced distribution chain. The conventional distribution chain, with mark ups being applied at each stage, can be short-circuited to reduce the final product cost.

♦ Ease of Updating. Changes to the published material can be made very easily. This means that on-line newspapers can compete with TV stations in their coverage of breaking news. If the material is reference material which has been distributed on CD-ROM, updates can be posted on the Internet, so that the user can download these and keep the reference material completely current.

♦ Breadth of Distribution. Material published on the Internet can reach millions of readers, whereas material held in libraries will only be available to a fortunate few.

The Disadvantages of Electronic Publishing are:

♦ Ease of Piracy. The material may be copied illegally and the authors denied royalties.

♦ Ease of Plagiarism. Portions of the material may be reproduced without credit to the authors or the copyright holders.

COMPUTERS IN EVERYDAY LIFE

Computers are now being used in almost all walks of life. They are becoming an indispensable tool, helping to make mankind more efficient and improve the quality of work output. The next section focuses on how computers are being used in different sectors.

Computers in the Home, at Work & in Education

COMPUTERS IN THE HOME

As mentioned earlier, computers have changed the way people do things. Almost every task is now being computerised. Some examples of how computers are used in the home are:

♦ For entertainment, i.e. playing computer games. There are Internet-based computer games which allow users to compete against other players who might be anywhere in the world.

♦ The old technology of using big boxes for television viewing is phasing out. If your computer has a TV and FM card, it can be used for watching TV and listening to the radio.

♦ DVD the New Technology Videos on CDs. Films can now be watched on a computer with a DVD drive.

♦ For storing family photographs, where these have been taken with a digital camera.

♦ For editing family videos, where these have been taken with a digital video camera

♦ To access the Information Super Highway, the Internet.

♦ To do online shopping or arranging money transfers whilst at home.

♦ Communicating with others abroad, having chat sessions with a friend abroad, sending e-mail, people are now running away from snail mail.

♦ At home a computer can be used to keep family information or records.

♦ The same computer can be used by children to do their homework and also for remedial purposes using Educational software, such as eduSoft Everyday Mathematics a multimedia CD design for O'Level Maths, EduSoft English Discovery, Biology, Geography CDs.

- Reference material and encyclopaedias which are published on CDs will require use of the computer to allow look-up or extract of material. Additional reference material can be obtained via the Internet.

- You can also practice Teleworking, working at home while accessing all the information you need on the companies computer and sending information to the office (other employees) using electronic mail. Teleworking has a number of advantages – no interruptions from other workers, no travelling to and from the office, flexable working hours. In addition the company saves on office space, office equipment and other facilities like a canteen.

  A major drawback is lack of interaction with work colleagues. This imples that in such an environment there is less emphasis on teamwork. The social side is also affected as there is lack of human contact and the exchange of ideas that comes from that contact.

- Reading your Bible. There are now computerised Bibles one can install in a computer and it is easy to use. Just type the verse and it is displayed.

COMPUTERS AT WORK

Computers offer a means for making employees more efficient, and so the world of commerce computerises to gain competitive advantage. Job seekers who know how to use a computer will have a distinct advantage over computer-illiterates

- In many offices the typewriter has been displaced by the word processor.

- Accounting packages e.g. Pastel, have been developed for accounting purposes

- Payroll packages help in the administration of payrolls and annual tax returns.

- Spreadsheets programs are now being used in most companies for financial and what-if analysis.

- Database management systems have been developed to keep company information, for example information about every employee.

- In industry Computer Aided Design has been introduced as a product design tool, and robots are being used to do simple repetitive tasks, e.g. the welding jobs on production lines that used to be done by

human beings. The robots are computer controlled and can work 24 hrs a day without losing concentration and hence boost company production. A robotic arm can average one weld per second.

♦ Advertising can be done on the Internet.

♦ In some hotels the use of ordinary keys is being phased out with the introduction of plastic cards, which you just need to insert and remove for the door to open. Some companies have also used the same technique for their staff to enter and leave the company premises.

♦ E-business is "electronic business" using the Internet for both business to business and business to consumer transactions. This will allow organisations to communicate more efficiently with both suppliers and customers, and facilitate improvements in supply chain management and customer relationship management.

♦ Airlines rely on computers for bookings/ticket sales. These systems enable a travel agent any where in the world to check on seat availability. e.g. It only takes a few minutes to book a flight from Harare to Rio de Janeiro via London.

COMPUTERS IN EDUCATION

In education computers are being used from kindergarten to university, in both administrative and educational functions.

For administrative purposes school computers are being used as follows:

♦ Keeping student information and school staff information.

♦ Printing examination papers and assignments

♦ Printing levy and tuition invoices.

♦ Keeping records of school cash flow

♦ Printing school reports.

♦ For school documentation.

For teaching purposes computers have made a difference in instructional methods:

♦ Students can now do collaborative learning with other students anywhere in the world and can also have Internet group discussions.

♦ Using some educational software the teacher becomes a facilitator rather than the source of information. New School versus Old School,

because in the old school teachers used to be the centre of all knowledge but in the new school students can find information from other sources like the Internet and share it with the teacher.

♦ Software such as Tutorials can directly instruct a student.

♦ Simulators are software designed to give students a better visualisation of a real biological process or phenomenon, without using the real biological or chemical material.

♦ Computers are being used to develop problem-solving abilities.

♦ Programming languages are being taught in schools.

♦ Homework can be done and submitted electronically.

COMPUTER BASED TRAINING OR INSTRUCTION (CBT)

This technology is now becoming common, whereby the learner sits at a computer and interacts with a program. It has advantages and disadvantages.

The Advantages of CBT are:

♦ There is no fast and slow learner because the student can learn on his own at his/her own pace.

♦ The learner has the freedom to repeat as many times as he/she wants.

♦ The combination of text, video, sound, pictures and animation can improve the rate of assimilation. This is the concept of multimedia.

♦ The program is also designed in such a way that it monitors student progress and gives feedback.

♦ These programs are user friendly and very interactive.

The Disadvantages are:

♦ The computer can only instruct and not teach or rather educate, because education or teaching goes as far as the sentiments of the person.

♦ It is dependent on technology.

♦ Students cannot ask questions, but can only follow what is given.

Computers in Daily Life

There is little that one does these days without involving a computer. Remember that an end user of the computer system is not only the person operating it, but also anyone who uses the information it produces.

HOW ARE COMPUTERS BEING USED IN SHOPS?

Electronic Point of Sale Terminals (EPOS) at checkout points monitor sales and control stock. They use Bar Code Readers to read bar codes on products. These black and white bars hold information to identify the specific product.

When an item is sold the correct price is automatically retrieved from the computer, and sales file and stock file records are updated.

What are the Advantages to the Customer?

♦ The customer will enjoy faster service at the check out till. If the scanner is not working the numbers can be punched in by the shop assistant.

♦ It is more accurate than typing the prices or punching in the numbers.

♦ The store will use sales information to re-stock according to demand, and so there will be fewer stock-outs.

♦ An itemised receipt shows the name of a purchased product, the quantity and the price.

What are Advantages to the Store Manager?

♦ Customers pass through the checkout points more quickly with fewer errors.

♦ There is less opportunity for fraud by staff.

♦ Goods are not priced individually but have only one code number which when processed will determine a price.

♦ Stock control is fully automated.

♦ Purchasing information is available so that stocks can be replenished according to demand.

In some large supermarkets, bar code readers are available so that the customer can check the price of a product before going to the till point.

HOW ARE COMPUTERS BEING USED IN BANKS AND BUILDING SOCIETIES?

Banks were among the first organisations to use computers, as early as in the 1950s. Computers in banks are used extensively for cheque processing, using Magnetic Ink Character Recognition that is difficult to forge. With this input device cheques can be read at a speed of 3000 cheques per minute.

When a cheque goes for processing, three sets of Magnetic Ink characters are required and these are:

♦ The customer's account code-every customer is given a unique account number.

♦ The sort code-every branch of every bank has a sort code.

♦ The cheque number. Cheques are numbered in sequence in a chequebook.

In addition, the amount the cheque has been made out for is captured when the cheque is presented for payment.

ATMS (AUTOMATIC TELLER MACHINES)

The use of ATMs or cash dispensers has removed the need to rush to the bank before it closes. ATMs work 24 hours a day, so money can be deposited or withdrawn at any time of the day. These ATMs are computer terminals connected to the central computer. Whatever instructions you give are sent to the central computer and the records are kept there.

What do I do to Obtain Cash from ATMs?

♦ Insert your Bank card into the slot. (A welcome message appears)

♦ Enter your PIN (Personal Identification Number – private password)

♦ Choose the service you want, or simply press the button next to the amount you want and wait

♦ Take back the bank card

♦ Take the money

♦ Take the receipt if you asked for it.

The card used to withdraw the money is plastic with a magnetic stripe similar to a credit card (VISA or MasterCard). The magnetic stripe is coded with the following data:

♦ Card holder's account number

♦ The PIN Personal Identification Number. For security reasons, do not write this on the card or divulge to anyone.

♦ The sort code

♦ The card holder's withdrawal limit

♦ The amount withdrawn so far that day.

How Does Electronic Funds Transfer Work?

When one withdraws money from an ATM that amount is automatically removed from the account and the new balance is set. This is known as the Electronic Funds Transfer because money is transferred electronically. When one pays for the shopping using a bankcard, that payment is transferred electronically from the customer's account to the supermarket's account. This transfer of funds is called EFTPOS (Electronic Funds Transfer Point of Sale)

What is On-line Banking?

This is telephone-based banking where customers can make bank transactions using the telephone or mobile phone or computer, using numbers to give instructions to the Bank Computer.

With this technology you can pay bills, get balances, move money from one bank to another. Some banks are also offering banking services through the Internet where one can use the keyboard for communication.

How are Computers being used in Hospitals?

The introduction of computers in hospitals has helped both the administrators and the doctors. The following are some of the uses of computers in hospitals:

♦ For keeping patients' records in a patient database to allow easy entering and retrieval of information.

♦ With mail merge techniques it is now easy to send reminders to patients.

♦ Computerised equipment is used in intensive care wards to monitor patients, with heartbeat, temperature, pressure, and movement sensors inputting critical data from the patient.

- ♦ Databases are created with details of patients requiring transplant surgery and in the event of transplant organs becoming available, these can be matched quickly to an appropriate patient.
- ♦ Doctors are now able to view a cross section of any body organ without cutting by using CAT technology. CAT means Computer Axial Tomography (a technology allowing the doctors to have an image of a cross section view of an organ of the body)
- ♦ Mothers can now be told the abnormalities or baby deformations before birth and proper preparations can be made. This is scanning technology.
- ♦ Most medical research is now computerised.

HOW ARE COMPUTERS BEING USED IN GOVERNMENT?

The uses of computers in this area are numerous and some have already been mentioned under other headings. A few more uses include:

- ♦ Creation of databases/information on public sector information such as parliament and its proceedings. Databases are also used to assist in revenue collection.
- ♦ General information on the country, including what it can offer to tourists and investors
- ♦ Aspects such as National registration and production of birth certificates have been computerised. This makes it east to collect relevant data such as births within a geographical area. Related to this car registration has been computerised, helping the police to track down criminals especially where the criminals attempt to transport the cars to another country.

It should be pointed out that the use of computers varies from country to country. It is best for one to find out more about e-government in their own country to come up with concrete examples of how that country's government is utilising computers.

All the examples above have shown how useful and powerful a tool the computer is. Have you ever stopped to wonder if there are any situations where human beings are more suited than computers? The answer to this question is in areas where decision-making has to be made. Computers no matter how complicated they may seem, cannot really think for themselves. Those used in artificial intelligence and expert systems base their judgements on stored information. This means that they cannot make their own judgements outside what has been fed into them. This means that for the forseeable future, humans are more suited in areas requiring reasoning, that is where one is required to think for themselves.

IT AND SOCIETY

A Changing World

The introduction of IT in society has changed the way many people live. Although not everyone has access to a computer, there are many different types of communication equipment like radios, televisions, satellite dishes, telephone and fax machines, which all use modern technology. All these affect how information travels and it now takes only a few seconds to send a letter abroad.

Although some people believe that the introduction of IT in the Society has made life more complicated, others believe that it has made life easier and now enjoy working at home using Tele working technology. All this is possible because we live in an Information Society where access to information is vital.

WHAT IS AN INFORMATION SOCIETY?

An Information Society is described as one in which a greater part of the population is involved in service industries such as finance, insurance, administration, education, the media etc. In the Agrarian Society people used hoes to produce output from the land. In the Industrial Society, people used machines to produce manufactured output from factories. In the Information Society people are now using information and communication technologies to disseminate information which is adding value to everyday life.

Information is necessary for one to make proper decisions and this information must be always up to date.

WHAT IS THE INFORMATION SUPERHIGHWAY?

The Information Superhighway, also known as the Internet, is a world-wide network of computers that can provide information on almost every subject, through the World Wide Web.

Information Technology has made many changes in society. The following are some examples of the changes:

♦   In offices there is now the concept of office automation, which means almost every task is now computerised, for example account ledgers

and books have become computer based spreadsheets and accounting packages. Document storage and retrieval have now replaced manual filing.

♦ The use of typewriters has been seen to change with the introduction of word processing packages.

♦ Basic phones have become digital and are being used to send mail at a faster speed, and for call conferencing.

♦ Computers have also helped physically handicapped people; e.g. teaching material can now be printed in Braille for use by the blind. Computer control systems that allow voice recognition have helped those without hands to give voice commands for doors, lights and alarms.

♦ Computers can help to connect people who are physically confined, with the outside world and to keep in touch with others.

♦ With computers anyone can communicate abroad at the cost of a local telephone call.

WHAT ARE THE ADVANTAGES OF USING COMPUTERS?

♦ Computers reduce or eliminate jobs that are repetitive for example retyping a document to correct mistakes, organising a weekly payroll or typing the same personalised letter to a large number of people.

♦ By using computers work can be completed faster, more easily and more accurately. Complex calculations can be done at high speeds using Spreadsheets.

♦ They also produce more professional output by the use of word processing and graphics

♦ Allow fast retrieval of information that would take a long time, or be impossible, with a manual search.

A Good Workspace

To create a good working environment one should practice good working habits, such as:

♦ Frequent breaks away from the computer, this is necessary to refresh the mind and to relax the hands.

- Appropriate position of the screen such that the screen is at the same level with the eyes.

- It is advisable to have an adjustable chair and the chair must not be too high or too low.

- The room should have adequate lighting so that you don't strain your eyes.

- It should be a clean and dust free environment.

- The room should have good ventilation, ideally, it should be air-conditioned.

Health and Safety

Since computers work with electricity it is always necessary for one to make sure that there is a clean power supply, and to ensure that the cables are safely secured, i.e. that there are no naked live wires and no cables obstructing or interfering with movement of workers. It is also necessary to ensure that power points are not overloaded.

There are also injuries that are associated with working in a bad environment, and some of them are RSI, eyestrain and problems of bad posture.

WHAT IS RSI?

RSI stands for Repetitive Strain Injury. This injury occurs when repeating the same action numerous times. For example when playing a game or doing work which only involves the use of the mouse. In this situation the arm is held steady while the wrist and fingers repeat the same small movements over and over. The muscles used to hold the arm steady are particularly prone to strain. Hence the name Repetitive Strain Injury. The continuous use of the keyboard can also cause RSI. Frequent breaks away from the computer are necessary to avoid these repetitive motions. To overcome this problem some organisations are using pads where the arms or wrists can be rested.

EYESTRAIN

Continuous use of computer screens may cause eyestrain or damage vision. The eyestrain problem can be made worse by using inferior monitors with poor resolution. Some of the problems are caused by the reflection from the screen, especially if the screen is facing the sunrays or when the user is facing the window. To reduce eyestrain the screen should be at the same level as the eyes, and not too close to the eyes. Anti-glare products like screen filters are available to reduce screen glare.

WHAT ARE THE PROBLEMS ASSOCIATED WITH BAD POSTURE

Due to practice of bad working habits, people have experienced problems related with posture, for example backache. This is because people slouch in their chairs, have their keyboards at the wrong height or sit too close to their screens. Some even use chairs which are not adjustable and do not give good back support. It is necessary that we take note and avoid all that has been mentioned above because we may end up blaming the computer yet it is our own problem.

ENVIRONMENTAL CONCERNS

As we use computers, we at thus accumulate a lot of printed documents as well as use up toner cartridges in the process. If these are recycled, this can help the environment.

If we employ the concept of a paperless office, by using electronic documents more, this reduces the need for printed materials.

I is now common to find monitors being manufactured that consume less power as a way to help the environment.

SECURITY, COPYRIGHT AND THE LAW

Information is vital and needs therefore to be protected and kept secure. The level of security required differs from company to company. There are several means that can be used to protect the information depending upon the nature of the threat.

There are three aspects of information which need to be taken note of in a computerised environment and these are:

♦ **Confidentiality**: Information should be available only to those who are supposed to have it, but there is a risk that other people may have access to it. This needs to be prevented.

♦ **Integrity**: Information stored for later use should be correct and complete for the purpose for which it was obtained, but there are times when this information can be corrupted. People should be aware of this risk.

♦ **Availability**: This means that information stored for later use should be available when people entitled to it need it. This is not always the case, as information in the computer can be difficult to retrieve in case of a power failure.

Computer systems can be threatened in different ways:

♦ **Hardware Failure**: The physical parts of the computer system may fail to work, for example the Hard disk may crash, or the keyboard may fail to function.

♦ **Software Failure**: The programs that are used with the hardware to make a complete functional computer may be damaged by a fatal program known as a virus or cease to work in the intended way.

♦ The information itself can be damaged, deleted or lost in some way.

So all of the above mentioned risks need to be considered and protective measures put in place.

Security

There are different threats that can attack computer systems and it is necessary to know about them and to know how to secure systems against these threats. When working in an office without a networked computer it is relatively easy to attain a high level of security. All you need to do is lock the office each time you leave and ensure that important documents are

not left lying about for visitors to read. A networked computer is similar to working in a general office where everyone uses the same cupboards and filing cabinets. In addition a disk crash will result in the loss of all information stored on that disk. The lost information can be impossible to recover if a second copy has not been kept.

ACTS OF GOD

Fire, floods, hurricanes and earthquakes can destroy equipment. Computer hardware should be secured by making good structures and good siting of the computer location. The equipment should also be insured.

Back ups are vital, and are simply duplicate copies of the vital information kept at a different place. The frequency of backups depends on how often the data changes. A secretary who keeps a hard copy of all the letters she types need never backup her data but a weekly or daily backup regime can save a lot of retyping. A bank on the other hand, needs to duplicate all data or have instant backups each time data is changed. Imagine your reaction if they were to lose your salary because of a computer failure a few minutes after it was deposited. It is certain that the hard disk will not run forever so the user must assess the level of risk and act accordingly. Backups are normally done on removable media such as tapes and zip drives, with the capacity to back up all the necessary information on the hard drive. Back up information should be kept at a separate location and in a fireproof safe.

And don't forget to save your work. A single copy on your hard disk is not referred to as a backup but is an important part of working with a PC. Don't wait until the letter or spread sheet is perfect in every aspect before saving it. Get into the habit of saving at least every 15 to 30 minutes. Remember that what you see on your screen is stored in RAM and will be lost if there is a power failure. Do not rely on a UPS (Uninterrupted Power Supply). Although a UPS will help protect your disk and usually give you time to save your data , you normally discover it is faulty when you need it most.

UNAUTHORISED ACCESS

Information should be kept secure against unauthorised access, for example hackers and co-workers. The managers work should not be available for perusal by a clerk. Hackers are people who dial into a computer by breaking passwords and codes to gain unauthorised access to information. They

can then steal the information, delete or change it. Individuals can also change the data to suit themselves and this is computer fraud, so the use of access level passwords for company staff is important. And don't forget that PCs can be stolen. Once a thief has a computer in his possession he has lots of time to break passwords and you have to start installing all your information on a new machine.

Stand-alone computers are not a risk to hackers as are computers connected to a network or the Internet.

It is advisable to encrypt data so that it cannot be decoded and read when in transit and to use passwords to control access to the computer.

Computer Viruses

WHAT IS A COMPUTER VIRUS?

A computer virus is a computer programme that can spread across computers and networks <u>by making copies of itself</u>, usually without the users knowledge. To be classed as a virus it must be able to <u>replicate itself.</u>

Viruses can have harmful side-effects. These can range from displaying irritating messages to deleting all the files on your computer.

HOW CAN A COMPUTER ACQUIRE A VIRUS?

Viruses can be acquired by:

♦   Using other people's infected floppy disks

♦   Copying illegal software

♦   Starting the computer with infected floppy disks in the drives

♦   Opening electronic mail messages or attachments which have been infected. Unless you recognise the sender and and the sender tells you that something is attached do not open it – just delete it.

♦   Down-loading infected software from the Internet.

HOW CAN ONE PREVENT COMPUTER VIRUS INFECTION?

♦ Do not use other people's diskettes unless you first check for viruses

♦ Do not illegally copy software and use it with your machine

♦ Beware of Internet downloads, some of them may have a virus

♦ Ensure that there is no floppy disk in the drive when you boot up the computer

♦ Avoid opening "Spam" electronic mail messages which advertise offers "too good to be true" such as free holidays

♦ Install anti-virus software, <u>and keep it up to date</u>.

WHAT HAS BEEN DONE TO OVERCOME COMPUTER VIRUS PROBLEMS?

Anti-virus programs have been developed. These are programs that locate and attack viruses. They can even be loaded resident in the memory so that they quickly report any virus entry. There are many different anti-virus programs. The following are some examples of the most popular programs:

♦ Doctor Solomon's Antivirus

♦ Norton Anti-virus

♦ MacAfee Anti-virus

These anti-virus programs should be updated regularly to cater for new viruses, because using an old version will not detect some of the new viruses or it can detect but fail to clean the virus.

Software suppliers plug holes and supply updates. A virus must be able to replicate itself so the writers look for 'holes' in the software. A virus writer probably knows more about a product like Outlook Express than the authors. When he discovers something the author overlooked he has a way to get his virus into the programme. But as soon as he releases the virus the authors get working to plug the hole. Then they release a new version of the software. It is a bit like securing your home. You can add burglar bars, a gate and razor wire but if you overlook something the thief will find it and all you can do is to plug the hole so he cannot get in that way again.

Keep your software up-to-date.

Copyright

Computer software can be copied very easily, without it affecting the original software in any way. This gives rise to what is called software piracy, i.e. the illegal use of software which has been copied rather than purchased. Correct purchasing of software will ensure that the developers of the software or copyright holders receive the required license fee. Piracy of software is the illegal use, WITHOUT the payment of the license fee.

There are a lot of people who share programs or rather software on a social basis without realising that this is a crime. People should be aware of copyrights. Please don't use software that has no license because this is a serious offence.

You should know that copying software or software piracy is illegal and is a criminal offence. Also using illegally copied software and manuals and running purchased software on two or more machines at the same time without a valid license for each machine is a criminal offence.

There are also legal penalties for breaking copyright law, which can be a fine or prison sentence.

Shareware is software that you are allowed to use on your machine for a limited evaluation period. The idea is that if you find the product useful and you wish to continue using it beyond the evaluation period, you then make a registration payment which will then entitle you further benefits of the full version of the software. Some shareware programs are automatically programmed to stop working after the evaluation period.

Freeware is any software that is free of any obligation to the end user. That is one is free to use it indefinitely as well as distribute it to others. However no technical support is available. Examples of freeware include demonstration disks and educational software. However some freeware may come with license information that you have to read and abide by.

User Licences

This license is the official or legal permission about the particular software. You need to read carefully the license information so that you do not misuse the software. For example if your user license may be said to accommodate 10 users, if you exceed this you are violating the manufacturer's rights.

Data Protection Act

The following are the principles of the Data Protection Act, which is intended to protect the data collected on personal matters. These are necessary because they protect our personal data from being misused. Privacy is all that we look forward to. Imagine yourself not being able to get insurance or a credit facility because some company which was holding your personal data decided to disclose it to some other company. Imagine yourself losing compensation because a company had wrong information.

The points below will try to protect you from all these risks.

♦ Personal data should be obtained and processed fairly and lawfully

♦ Data obtained for personal use should be held only for specified purposes

♦ Personal data should not be used for any reason incompatible with its original purpose.

♦ Personal data should be relevant and adequate for the purpose

♦ The personal data should be accurate and up to date

♦ Personal data should not be kept longer than necessary

♦ It should be made available to the individual concerned and provision made for correction.

♦ Personal data should be kept secure.

It is also necessary to point out that this Act does not apply to some areas like:

♦ Data relating to crime detection

♦ Immigration data

♦ Data relating to income tax assessment and collection.

♦ Data not held on computers

♦ Data that is required by law to be made public.