

ECDL Module 1

REFERENCE MANUAL

Concepts of Information Technology (IT)

PC Edition for ECDL Syllabus Four



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1.1 General Concepts

1.1.1 Hardware, Software, Information Technology

1.1.1.1 Understand the terms hardware, software, Information Technology (IT).

Hardware

- The term hardware refers to the physical components of your computer such as the system unit, mouse, keyboard, monitor etc.

Software

- The software is the collection of instructions which makes the computer work. For instance, when you type in words via the keyboard, the software is responsible for displaying the correct letters, in the correct place on the screen. Software is held either on your computer's hard disk, CD-ROM, DVD or on a diskette (floppy disk) and is loaded (i.e. copied) from the disk into the computer's RAM (Random Access Memory), as and when required.

Information Technology (IT)

- This is a general term which relates to the use of computers as an aid to creating and maintaining data, i.e. information. IT is related to all aspects of managing and processing information, especially within a large organisation. Computers are critical to managing information, and computer departments within large organisations are often called IT departments. Alternative phrases are IS departments (Information Services) or MIS departments (Management Information Services). People working with computers within large companies will often refer to their job, as "working in IT".

1.1.2 Types of Computer

1.1.2.1 Understand and distinguish between mainframe computer, network computer, personal computer, laptop, personal digital assistant (PDA) in terms of capacity, speed, cost, and typical users.

What is a mainframe computer?

- Mainframe computers are the big, powerful, expensive computers used in the background by most large organisations. The power of the mainframe can be distributed amongst many people accessing the mainframe via their own PC. Organisations such as large insurance companies would use the mainframe to keep track of their policyholders and send out renewal notices.

What is a PC?

- IBM invented the PC (Personal Computer) way back in 1981. All PCs released since then are in many ways compatible with the original design, though many extensions have been made. The term PC compatible relates to PCs manufactured by companies other than IBM which are compatible with the traditional PC specification. In the early days, most PCs ran an operating system called DOS (Disk Operating System). These days most PCs will be running a version of Microsoft Windows.

What is a Mac?

- The Apple Mac is a computer, but NOT a PC. It uses a different operating system, and requires special versions of application programs (such as word-processors or spreadsheets). Even the hardware add-ons have to be customised to some extent to be able to be connected to a Mac. In the early days the thing which really distinguished the Mac over the PC was the GUI (Graphical User Interface), or in plain English the way you could use the mouse to drive the computer. In the early days of the PC, you really had to be a bit of an expert to use and maintain your PC. Recently the differences between the PC and the Mac have blurred, with Microsoft buying a stake in Apple.



More information: <http://www.apple.com>

What is a networked computer?

- A network allows you to connect two or more computers together. This allows data stored on one PC to be retrieved by other PCs connected to the network. It also allows the sharing of resources. Thus instead of each PC requiring its own printer to be directly connected to it, you can have a single printer shared amongst many networked PCs. In the early days, to network PCs together was a complicated task, only to be attempted by qualified professionals. These days most people with a good working knowledge of Microsoft Windows can install and configure a Windows based network. However to get the best out of your network, in terms of performance and security, still requires a qualified, experienced technician.

What are laptop & palmtop computers?

- Laptop computers, as the name implies, are small portable computers which can run on batteries as well as mains power. They use special screens, rather than the traditional bulky VDUs (Visual Display Units), which allows for longer battery life as well as portability. A newer term, "Notebooks", simply indicates a VERY small laptop. These are especially popular with salespersons on the move or people giving presentations. While they tend to still be more expensive than an equivalent Desktop computer, they can now match the power of a Desktop computer. Palmtops are even smaller computers which can literally fit into the palm of your hand.

What is a Personal Digital Assistant (PDA)?

- These devices use a special pen, rather than a keyboard and can be used for storing and retrieving information. Like most computer devices, many can connect to the Internet. They are extremely compact.



Types of computer - Mainframe

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

Types of computer - PC

- **Capacity:** Large hard disks combined with a work working memory (RAM)
Speed: Fast. Normally measured in GHz.
Costs: Getting cheaper by the day.
Typical Users: Home users, large and small offer users. Education, Doctors. In fact just about everyone needs to know how to operate a PC these days.

Types of computer - Networked PC

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

Types of computer - Laptop

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

Types of computer - Palmtop

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

Types of computer - PDA (Personal Digital Assistant)

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

1.1.3 Main Parts of a Personal Computer

1.1.3.1 Know the main parts of a personal computer such as: central processing unit (CPU), hard disk, common input or output devices, types of memory. Understand the term peripheral device.

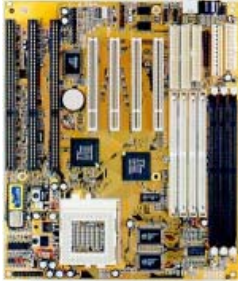
The System Unit

- The "system unit" is the name given to the main PC box which houses the various elements which go together to make up the PC. For instance within the system unit is the computer system's motherboard, which contains all the main components, such as the CPU. The system unit also houses items such as the hard disk, the floppy disk and CD-ROM drives etc. System units come in two basic varieties, the tower version, as illustrated, or a desktop version, which is designed to sit on your desk with your monitor on top of the system unit.



The System (Mother) Board

- The system (mother) board is contained within your system unit and all the vital computer systems plug directly into the system board. The CPU is normally housed on your system board along with all the other electronic components. Other items such as the hard disk are attached to the system board, either directly or via cables. These boards are getting smaller and smaller as the components become more integrated. If you open up a modern system you will find that it is mainly full of air.



The CPU

- The CPU (Central Processing Unit) is normally an Intel Pentium (or equivalent) and it is one of the most important components within your computer. It determines how fast your computer will run and is measured by its MHz or GHz speed. Thus, a 2 GHz Pentium is much faster than say a 1 GHz Pentium CPU. It is the CPU which performs all the calculations within the computer, when running programs such as word-processors, spreadsheets and databases. See page 16 for more information.

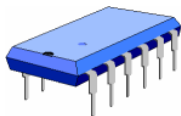
Memory (RAM)

- The RAM (Random Access Memory) within your computer is where the operating system is loaded to when you switch on your computer and also where your applications are copied to when you start an application, such as a word processor or database program. When you create data, (e.g. letters and pictures), these are initially created and held in RAM and then copied to disk when you save the data. As a rule of thumb, the more RAM you have installed in your computer the better. These days you will commonly find over 128 Megabytes of RAM installed.



ROM-BIOS

- The ROM-BIOS (Read Only Memory - Basic Input Output System) chip is a special chip held on your computer's system (mother) board. It contains software which is required to make your computer work with your operating system, for instance it is responsible for copying your operating system into RAM when you switch on your computer.



Serial Port

- The serial port is a socket located at the back of your computer which enables you to connect items to the computer, such as a modem. They are commonly labelled as COM1 or COM2.



Parallel Port

- The parallel port is a socket located at the back of your computer which enables you to connect items to the computer, such as a printer. It is commonly labelled as LPT1 or LPT2.

Universal Serial Bus (USB)

- The Universal Serial Bus is a relatively new item within the PC. You will see one or more USB sockets at the back of the system unit, allowing you to plug in devices designed for the USB. These devices include printers, scanners and digital cameras.



What are input devices?

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

What are output devices?

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

What is a peripheral device?

- A peripheral device is any device which you can attach to your computer. Thus, you could attach a scanner or modem to the back of your system unit.

The Keyboard

- An Input device. The keyboard allows you to type information into the computer. It has evolved over the years and many people now use a Microsoft style keyboard, which has additional keys designed to make Microsoft Windows easier to use.

The Mouse

- An Input device. When using an operating system, such as Microsoft Windows, you use the mouse to select drop down menus, to point and click on items, to select items and to drag and drop items from one place to another.



CD

- Most computers are now supplied with a CD-ROM (Compact Disc - Read Only Memory) drive. CD-ROM discs look exactly like music CDs but contain computer data instead of music. The advantage of a CD-ROM is that it can hold a vast amount of data (equivalent to the storage capacity of over 450 floppy disks). The other big advantage of CD-ROMs is that they are interchangeable. This means that you can own a range of different CD-ROMs and choose which one to insert into your CD-ROM drive.

DVD Drives

- Short for "Digital Versatile Disk". Similar to CD-ROM drives but allows you to use DVD disks, which contain vastly more information than a traditional CD-ROM disk. These also transfer the data from the disk to the computer far faster, allowing you to watch movies on your computer screen. A CD-ROM can store 650 MB of data, while a single-layer, single-sided DVD can store 4.7 GB of data. The two-layer DVD standard allows a capacity of 8.5 GB. A double-sided DVD increases the storage capacity to 17 GB (or over 25 times the data storage capacity of a CD-ROM).

Floppy disk

- Floppy disks are also known as diskettes. They are very slow compared to hard disks or CD-ROMs, and hold relatively small amounts of data (1.44 Mbytes). Sometimes people will backup (i.e. copy) important data from their hard disk to floppy disks. However, as diskettes are notoriously unreliable this is not the best way of backing up valuable data (but is better than nothing).

Zip Disc

- A Zip disk is like a bigger version of the floppy disk, the main difference being that a single Zip disk can hold up to 250 Mbytes of data. They also offer increased speed compared to the old floppy disk.



Hard (Fixed) Disk

- Hard disks are the main, large data storage area within your computer. Hard disks are used to store your operating system, your application programs (i.e. your word processor, games etc) and your data. They are much faster than CD-ROMs and floppy disks and can also hold much more data. The picture shows the inside of a hard disk (which you would not normally see). Hard disks are installed within the system unit of your computer.

The Monitor

- An output device. The monitor is the TV type screen on which you view your programs. They are supplied in different sizes, common sizes range from 15" to 21" screens. You should be aware that poor quality or badly maintained monitors could harm your eyesight.

Additional items or cards

- Many 'extra' components can easily be fitted to your computer, which has the advantage of making the computer 'upgradeable' as newer and better hardware comes along.

Sound cards and speakers

- Many computers are now supplied with sound cards and speakers which means that when you run 'multi-media' programs, you can listen to sounds which are played back via your computer. If you have a microphone and suitable software, you can also record sounds. You can even purchase special software which will allow you to talk to your computer and get the computer to type the words you have spoken on your screen. In time, this type of software may replace the keyboard.



Modems

- A modem is a device which is used to attach your computer to the telephone system. The modem converts data into sound which is sent over the telephone line, the receiving modem turns the sounds back into data. If you wish to connect to the Internet, you will need a modem (or equivalent device). Modems used to be large boxes that you had to plug into the computer, but now modems boxes have become very small and in many cases the modem is actually inside the computer. If you are using ISDN or broadband then you will use another device similar to a modem.



Printers

- Most data is printed once you have created it and there are a vast number of different printers available to accomplish this. Most common are ink jet and laser printers both of which can now produce coloured output (at a cost).

Scanners

- Scanners allow you to scan printed materials into your computer, which can then be stored within the computer. These pictures can then be altered, resized and printed as

required.



Recordable CDs

- CD-ROMs are read-only devices, but increasingly people are purchasing a special type of CD drive unit which allows you to record data, music or video to your own CDs. These devices require the purchase of special CDs to which you can write, called CD-R (Compact Disc – Recordable).

Tape backup

- A tape backup unit allows for regular backing up of your data. These tapes can store a vast amount of data at a low cost. DAT (Digital Audio Tape) devices are commonly used for backups. The DAT tapes which are used can backup enormous amounts of data (i.e. over 4 GBytes per tape). The devices are also fast and reliable.

What is PCMCIA?

- Portables by their very nature are very compact and require smaller than standard parts such as hard disks and CD-ROM drives. Many portables are supplied with special adaptor sockets which enable what are called PCMCIA compatible hardware to be connected to them. PCMCIA components tend to be more expensive than standard computer parts which are designed for more bulky desktop computers.

More information: <http://www.pcmcia.org>

1.1.4 Computer Performance

1.1.4.1 Know some of the factors which impact on a computer's performance, such as: CPU speed, RAM size, the number of applications running.

Factors affecting performance

- **CPU Clock speed:** The computer clock speed governs how fast the CPU will run. The higher the clock speed the faster the computer will work for you. The clock speed is given in megahertz (MHz). The original IBM PC ran at 4.77 MHz whereas modern PCs will run at over 2000 MHz, which gives you an idea of how far things have progressed. The higher the MHz speed the faster the computer.

RAM size: As a rule the more memory you have the faster the PC will appear to operate. Windows also uses the hard disk a lot, so logically the faster the hard disk can operate

then again the faster the PC will appear to run.

Hard disk speed and storage: Hard disks are also measured by their speed, defined by the disk access time, which is measured in milliseconds. The smaller this access time the faster the hard disk will store or retrieve data. The data storage capacity of hard disks continues to increase as new products are released. The disk storage capacity is measured in Gigabytes (GBytes). 1 GByte is equivalent to 1024 Mbytes.

Free Hard Disk Space: To get the most out of your Windows based PC, you not only need a fast hard disk but also a large hard disk with plenty of "spare space". This is due to the fact Windows is constantly moving data between the hard disk and RAM (Random Access Memory). Microsoft Windows will create many so-called "temporary files" which it uses for managing your programs. In fact, if you have very little free hard disk space you may find that Microsoft Windows will not be able to run your programs at all.

De-fragmenting Files: If you are running Windows you may find that if you click on the **Start** menu, select **Programs**, and then select the **Accessories / System tools** group, there is a de-fragmentation program. Running this periodically may noticeably speed up the operation of your PC. When you use a PC, over a period of time the files get broken up into separate pieces which are spread all over the hard disk. De-fragmentation means taking all the broken up pieces and joining them back together again.

Multitasking considerations: Windows is a multitasking system, which means that it can run more than one program at a time. However the more programs which are running at the same time, the slower each one will run. To some extent this slowing effect depends on what each program is doing. Editing a large, full colour picture for instance can take up a lot of CPU time.

1.2 Hardware

1.2.1 Central Processing Unit

1.2.1.1 Understand some of the functions of the CPU in terms of calculations, logic control, immediate access memory. Know that the speed of the CPU is measured in megahertz (MHz) or gigahertz (GHz).

The CPU (Central Processing Unit)

- The CPU is the brains within your computer. It performs most of the calculations within the computer and is responsible for the smooth running of your operating system (Microsoft Windows) as well as your application programs, such as word-processors, spreadsheets and databases. There is a small amount of memory associated with the CPU, which it uses to perform these operations. It also accesses and uses the main memory (RAM - Random Access Memory) within your computer. In many ways, the CPU is the single most important item within your computer which governs the overall speed of your computer. The CPU's speed is measured in MHz. This relates to the frequency at which the CPU runs and the higher the MHz rating of your CPU the faster your computer will run. To give you some indication of how PCs have advanced over the years, the original IBM PC released in 1981 ran at less than 5 MHz while modern PCs can run at speeds well in excess of 2000 MHz (2 GHz). Note that 1000 MHz is the same as 1 GHz.

More information:

Intel: <http://www.intel.com>

AMD: <http://www.amd.com>

Cyrix: <http://www.viatech.com>

1.2.2 Memory

What is computer memory?

- You can store data on your hard disk, while data which is being processed is stored in RAM (Random Access Memory). Data which is stored on a hard disk can be permanent, while data in RAM is only temporary. Normally when people talk about memory in relation to a PC, they are talking about RAM.

1.2.2.1 Understand different types of computer memory such as: RAM (random-access memory), ROM (read-only memory) and distinguish between them.

What is RAM?

- Random Access Memory (RAM) is the main 'working' memory used by the computer. When the operating system loads from disk when you first switch on the computer, it is copied into RAM. The original IBM PC could only use up to 640 KB of memory (just over half a megabyte), whereas a modern computer can effectively house as much RAM as you can afford to buy. Commonly modern computers are supplied with over 128 MB of RAM. As a rough rule, a Microsoft Windows based computer will operate faster if you install more RAM. When adverts refer to a computer having 128 Mbytes of memory, it is this RAM which they are talking about. Data and programs stored in RAM are volatile (i.e. the information is lost when you switch off the computer).

What is ROM?

- Read Only Memory (ROM) as the name suggests is a special type of memory chip which holds software which can be read but not written to. A good example is the ROM-BIOS chip, which contains read-only software. Often network cards and video cards also contain ROM chips.

What is the ROM-BIOS?

- The 'Read Only Memory Basic Input Output System' chip is a chip located on the computer's system (mother) board, which contains software. This software performs a variety of tasks. When you first switch on the computer the ROM-BIOS software performs a self-diagnostic to check that the computer is working OK. This software then loads your operating system from the disk into the RAM.

What is flash BIOS?

- Most modern computers are actually supplied with a flash BIOS rather than a ROM-BIOS. This chip contains exactly the same type of in-built software, but has the advantage that the software on the chip can be upgraded. This upgrade is achieved by simply running a small program supplied by the computer manufacturer.

What is video (graphics) memory?

- The picture which you see on your screen is a form of data and this data has to be stored somewhere. The on-screen pictures are held in special memory chips called video memory chips; these chips are usually located on the video card. A modern computer will be supplied with several Megabytes of video memory.

1.2.2.2 Know how computer memory is measured; (bit, byte, KB, MB, GB, TB). Relate computer memory measurements to characters, files and directories/folders.

- It is important to understand the following terminology:

Basic Units of Data Storage: It is important to realise that the term digital computer refers to the fact that ultimately the computer works in what is called binary. Humans work in tens (because we have 10 fingers). To use the jargon humans work in base 10. A digital computer uses the numbers 0 and 1 (or on and off if you prefer). When we talk about computer storage, either the amount of memory (RAM) or the hard disk capacity

we are talking about numbers which are multiples of 0 or 1.

Bit: All computers work on a binary numbering system, i.e. they process data in ones or zeros. This 1 or 0 level of storage is called a bit. Often hardware is specified as a 32-bit computer, which means that the hardware can process 32 bits at a time. Software is also described as 16 bit, 32 bit or 64 bit software.

Byte: A byte consists of eight bits.

Kilobyte: A kilobyte (KB) consists of 1024 bytes.

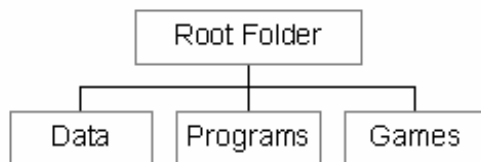
Megabyte: A megabyte (MB) consists of 1024 kilobytes, approximately 1,000,000 bytes.

Gigabyte: A gigabyte (GB) consists of 1024 megabytes, approximately 1,000,000,000 bytes.

Terabyte: A terabyte (TB) consists of approximately 1,000,000,000,000 bytes.

Files: Data and programs are stored on your disk as files. There are different types of files, such as the files in which you store your data, the files which contain your programs and also files used to store your operating system (such as Microsoft Windows).

Directories (folders): Directories or folders are used to group files with a similar theme together. For example, you could have a folder called "Accounts" containing all your accounting related files, or a folder called "Customers" containing correspondence with your customers. Folders can also contain sub-folders to further divide files. The uppermost level folder is often referred to as the "root" folder (or directory). Sometimes you may see a diagrammatic representation of folders, as illustrated below.



In this example, we have the root folder at the top. Below this are three sub-folders called Data, Programs and Games.

Records: A record is a collection of data held within a file. It is the sort of storage unit used by a database. For more information, please see the ECDL module concerned with databases.

1.2.3 Input Devices

1.2.3.1 Identify some of the main devices for inputting data into a computer such as: mouse, keyboard, trackball, scanner, touchpad, light pen, joystick, digital camera, microphone.

The Mouse

- The mouse came into common use on a PC with the introduction of the Microsoft Windows operating system. Before this, the operating system (DOS) would normally be controlled via the keyboard. These days it is vital to be a competent mouse user. There are many different types of mice, a commonly used model now has a small wheel on it which when combined with the correct software allows additional functionality and fine control over the use of your applications.



The Keyboard

- The keyboard is still the commonest way of entering information into a computer. There are a number of different types, including those specially designed for use with Microsoft Windows. The quality of the keyboard is often overlooked when buying a PC; it should be robust and easy to use.



Tracker Balls

- A tracker ball is an alternative to the traditional mouse and favoured by graphic designers. Tracker balls often give much finer control over the movement of the items on the screen. They may take a while to get used to if you are used to the traditional mouse, but offer a lot in terms of added flexibility.



Scanners

- A scanner allows you to scan printed material and convert it into a file format which may be used within the PC. You can scan pictures and then manipulate these inside the PC using a graphics application of your choice. In addition, you can scan printed text and convert this not just to a picture of the text but also to, actual text which can be manipulated and edited as text within your word-processor. There are a number of specialist programs, generically called OCR (Optical Character Recognition) programs which are specifically designed for converting printed text into editable text within your applications.

Touch Pads

- A touch pad is a desktop device and responds to pressure. Used in conjunction with a special pen they can be used by graphic artists wishing to create original, digital artwork.

Light Pens

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



Joysticks

- Many games require a joystick for the proper playing of the game. There are many different types, the more sophisticated respond to movement in 3 axis directions, as well as having a number of configurable buttons. Like most things in life you get what you pay for with joysticks and it is worth investing in a good, strongly constructed model, especially bearing in mind that children will hammer these devices whilst playing games.



Voice input for PCs (microphones)

- Early voice recognition systems offered very poor results, due to the limitations of the software combined with hardware limitations. It takes an awful lot of CPU processing power to convert the spoken word into text which appears on the screen. Things are changing rapidly however and recent systems allow you to talk to a PC and see text appear on the screen. Most of these systems require an initial training period, where you train the software to respond to your particular voice. Whilst still not perfect this is a key technology of the future.

Web Cams

- Ever since it was invented, the Web has become increasingly interactive. You can now use a small digital movie camera (a Web cam) mounted on the PC monitor to allow two-way communication involving not just text communication but sound and video communication as well. While not yet considered a standard piece of PC kit, it is only a

matter of time ...



Digital Cameras

- A digital camera can be used in the same way a traditional camera can, but instead of storing images on rolls of film which require developing, the images are stored digitally in memory housed within the camera. These pictures can easily be transferred to your computer and then manipulated within any graphics programs which you have installed on your computer. Currently they are limited by the quality of the image recorded and the number of pictures which you may store within the camera.

1.2.4 Output Devices

1.2.4.1 Identify common output devices for displaying the results of processing carried out by a computer, such as: monitors, screens, printers, plotters, speakers. Know where these devices are used.

The VDU (computer monitor or screen)

- The VDU (Visual Display Unit) is the computer screen used for outputting information in an understandable format for humans. Remember that at the end of the day the computer works in binary code (a series of on/off impulses). It is hard to realise that the original electronic computers did not have a screen.



Flat screen monitors

- Traditional computer monitors are based on the same sort of technology which is used within a television screen.

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



Screen size

- You should be aware that often if you specify a screen of a certain size, say a 17-inch screen, this is the size measured diagonally, not horizontally across the screen. If you are upgrading you should also ask for the "visible viewing area" of the screen.

Graphics for games

- Many games require very advanced graphics cards (boards) to be installed within your computer to make them run. These advanced graphics cards contain their own CPU which is dedicated purely to displaying the graphics on your screen. You should find that a recent PC has this advanced graphics capability built-in whereas PCs from only 2-3 years ago may not.

Computer presentation projection devices

- These are projection devices which can be attached to your computer and are useful for displaying presentations to a group of people. They are best used in combination with presentation programs, such as Microsoft PowerPoint. They are used within education and are also very popular for sales presentations. The price of these devices has dropped dramatically recently. When purchasing one of these devices the two things to look out for are the resolution (go for a minimum of XGA) and the brightness of the lamp (the brighter the better). Other factors to be aware of are the quietness (or otherwise) of the device, as well as the cost of replacement bulbs.



Different types of printer

- There are many different types of printers. In large organisations, laser printers are most commonly used because they can print very fast and give a very high quality output. In most organisations, the printers are connected to the computers via a network. This means that each person with a computer does not require his or her own printer. Each computer connected to the network can print using a particular shared printer.

Laser printers

- Laser printers produce high print quality at high speed. They are called "laser printers" due to the fact that they contain a small laser within them. There is a wide range of laser printer manufacturers and one buzzword to be aware of is Postscript, a type of printer which is designed to give very high quality reproduction of pictures.

Colour laser printers

- Originally, most laser printers would only print in black and white (mono). More recently colour laser printers have dropped in price and are entering wide spread use. While many of these produce excellent results, you should be aware of the fact that the "price per page", especially if you are using a lot of colour on a page can be very high compared to the cost of printing in black and white.



Inkjet printers

- Inkjet printers work by using tiny jets to spray ink onto the paper. Inkjet printers are very quiet in operation and produce print quality comparable to that of laser printers, though laser printers still have the edge in terms of speed. Inkjet printers are ideal for low volume printing where high quality print is required and speed is not a high priority, e.g. printing letters in a small office or in the home.

Dot Matrix printers

- Dot matrix printers work by firing a row of pins through an ink ribbon onto the paper. The more pins the print head has the higher the quality of the print, most modern dot matrix printers have 24 pins. Unfortunately, dot matrix printers can generate a lot of noise and do not produce a very high quality of print, especially when printing graphics. As a result, the inkjet printer has now largely replaced the dot matrix printer. Dot matrix printers are used for high volume / low quality printing, e.g. printing company pay slips.



Printer Memory

- It is important to realise that most printers have their own memory chips, in the same way that each computer has its own memory. If you are printing very large graphics (i.e. pictures), and want the best quality output from your printer then you should consider adding more memory to your printer. This must only be done by a qualified person, and has the benefit of really speeding up the rate at which you can print pages in many cases.

Cost of running a printer

- When you buy a printer, one of the things the salesperson will not necessarily stress is how much it will cost to keep that printer running. Laser printers do not use ink; they use something called toner which is normally supplied in a sealed unit called a toner cartridge. Each toner cartridge will allow you to print a certain amount of pages and when the toner is used up it needs to be replaced. In some cases the costs of these toner cartridges is very high. Ink jet printers can work out even more expensive to run.

Plotters

- A plotter is an output device similar to a printer, but normally allows you to print larger images. Their use is common in the design and research sector.

Speakers

- Most computers are sold with the capability to add a pair of speakers to your system unit. In fact, in some cases, the monitor may have speakers built directly into the unit. This enhances the value of educational and presentation products and can now be considered a standard PC component.

Speech synthesizers

- A recent development is the ability not only to display text on a monitor but also to read the text to you. Thus, you could receive a text email from a colleague and the system could read that email to you. This is of enormous benefit to the visually impaired when using a computer. On the flip side, it is now possible to use a microphone to talk to the computer and for the computer to directly convert the spoken word into text which will be displayed within say your word-processor. Whilst these systems are far from foolproof they are getting better as more advanced software is being made available.

1.2.5 Input/Output Devices

1.2.5.1 Understand some devices are both input/output devices such as: modems, touch screens.

Input/Output devices

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

1.2.6 Storage Devices

1.2.6.1 Compare the main types of memory storage devices in terms of speed, cost and capacity such as: diskette, Zip disk, data cartridges, CD-ROM, internal, external hard disk.

Internal hard disks

- **Speed:** Very fast. The speed of a hard disk is often quoted as "average access time" speed, measured in milliseconds. The smaller this number, the faster the disk is.
- **Capacity:** Enormous. Measured in Gigabytes. A Gigabyte is equivalent to 1024 Megabytes.
- **Cost:** Hard disks costs are falling rapidly and normally represent the cheapest way of storing data.

External hard disks

- **Speed:** Normally slower than internal disks, but more expensive versions offer the same performance as internal hard disks.
- **Capacity:** Same as internal disks.
- **Cost:** More expensive than internal disks.

Zip drives

- You can install a Zip drive into your computer and then you can insert Zip disks into that drive. The great thing about these disks is that you can remove one disk and replace it with another, in exactly the same way that you can place different diskettes in your diskette drive. They are great for backing up data and exchanging data between non-networked computers.



- **Speed:** Slower than normal hard disks but ideal for backups.
- **Capacity:** 100 or 250 Megabytes.
- **Cost:** You have to consider both the cost of the drive, plus the cost of each disk which you wish to use in the drive. Often suppliers will sell the drive plus a pack of 5 disks at a bundled discount price.

Jaz drives

- A Jaz drive is similar in concept to a Zip drive. The main difference between them is that a Jaz drive can hold a lot more data. Alas, the disks are not the same as used in a Zip drive and as a result, you cannot use a Zip disk in a Jaz drive or a Jaz disk in a Zip drive.



- **Speed:** Slower than normal hard disks but ideal for backups

- **Capacity:** Around 2 Gigabytes (2048 Megabytes).
- **Cost:** You have to consider both the cost of the drive, plus the cost of each disk which you wish to use in the drive. Often suppliers will sell the drive plus a pack of 5 disks at a bundled discount price.
- **More information:** <http://www.iomega.com>

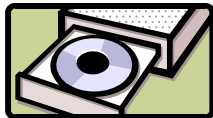
Diskettes (floppy disks)

- **Speed:** Very slow.
- **Capacity:** Normally 1.44 Mbytes.
- **Cost:** Very cheap.



CD Disks

- **Speed:** Much slower than hard disks. The original CD-ROM specification is now given a value of 1x speed, and later, faster CD-ROMs are quoted as a multiple of this value. Thus, a 50x CD-ROM is 50 times as fast as the original 1x speed CD-ROM specification.
- **Capacity:** Around 650 Mbytes.
- **Cost:** CD drives are becoming very inexpensive. The disks themselves are so cheap that they are often given away when they contain samples or demo software (i.e. free versions).



DVD Drives

- **Speed:** Much faster than CD drives but not as fast as hard disks.
- **Capacity:** Up to 17 GBytes.
- **Cost:** Slightly higher than CD drives.

What is the difference between internal and external hard disks?

- Internal hard disks are located inside your main computer unit, while external hard disks are joined to the main computer unit via a lead which you plug into the back of your computer unit. Some external hard disks will plug into the USB port (connector) located at the back of your computer. Other external hard disks require the installation of a special card within your computer which allows the connection of the external hard disk to the computer unit.

1.2.6.2 Understand the purpose of formatting a disk.

Why format a disk?

- Originally when you purchased a pack of floppy disks (diskettes), you had to format them prior to use. Today, most floppy disks are supplied pre-formatted.

Formatting a disk is like putting lines on a blank sheet of paper, so that you can write on that paper. Formatting allows the operating system (i.e. Windows) to read information stored on the disk and also to store information on the disk.

The manufacturer will have formatted your hard disk for you prior to delivering the PC to you. You should be very careful about formatting a disk, as any data on the disk will be lost after re-formatting. You would not normally format a hard disk, this should only be done by a qualified person. You do not even need to know how to format a hard disk!

1.3 Software

1.3.1 Types of Software

1.3.1.1 Distinguish between operating systems software and applications software. Understand the reasons for software versions.

What is an Operating System?

- The operating system is a special type of program which loads automatically when you start your computer. The operating system allows you to use the advanced features of a modern computer without having to learn all the details of how the hardware works.

What is an Application Program?

- An application program is the type of program which you use once the operating system has been loaded into memory (RAM). Examples include word processing programs (for producing letters, memos etc), spreadsheets (for doing accounts and working with numbers), databases (for organising large amounts of information), games and graphics programs (for producing pictures, advertisements, manuals etc).

Why are new versions of software released year after year?

- A cynic might say 'so that the companies which manufacture software can continue to make money each year'. Another cynic may say 'so that you can pay to have the unfinished version you bought last year patched up a little, so there are less bugs in it this year'. The software manufacturers claim that each new release has less bugs, greater flexibility and more features. Often if you wish to see the version of software you are using, you can click on the product's **Help** drop down menu, and then click on the **About** (or similar) command.

1.3.2 Operating System Software

1.3.2.1 Describe the main functions of an operating system and name some common operating systems.

What is an Operating System?

- The operating system is a special type of program which loads automatically when you start your computer. The operating system allows you to use the advanced features of a modern computer without having to learn all the details of how the hardware works. There are a number of different types of operating system in common use. The IBM PC (Personal Computer) was introduced way back in 1981 and was originally supplied with an operating system called DOS (Disk Operating System). This operating system was very basic, and you had to be a bit of a computer expert just to understand how to use it.

It was NOT user-friendly. Later on, Microsoft introduced Windows and this is the operating system which is most widely used on PCs today.

- To complicate matters further, there are a number of different types of Windows. The first widely used version of Windows was called Windows 3.1. This was more powerful than DOS and far easier to use. It had a Graphical User Interface (GUI), i.e. you could 'drive' it using a mouse and drop down menus. Later, different releases of Windows were introduced. The good news is that later versions of Microsoft Windows look almost identical to each other and are all much easier to use than Windows 3.1.
- IBM produced an operating system called OS/2 but this was largely ignored and is only used by a few companies.
- UNIX and Linux are other examples of operating systems which may be run on PCs.
- Other types of computers, such as those manufactured by Apple have a completely different operating system.

Microsoft Windows: Microsoft: <http://www.microsoft.com>

IBM OS/2: <http://www.ibm.com/software/os/warp>

Linux: <http://www.www.linux.com>

Linux: <http://www.www.linux.org>

UNIX: <http://www.www.unix.org>

1.3.3 Applications Software

1.3.3.1 List some common software applications such as: word processing, spreadsheet, database, Web browsing, desktop publishing, accounting, together with their uses.

What is an application program?

- An application program is the type of program which you use once the operating system has been loaded. Examples include word-processing programs (for producing letters, memos etc), spreadsheets (for doing accounts and working with numbers), databases (for organising large amounts of information), games programs and graphics programs (for producing pictures, advertisements, manuals etc).

Word processing

- A word processing program (such as Microsoft Word) allows you to produce letters, memos, etc., easily. You can easily mail merge a list of names and addresses to produce mass mailers, individually addressed to customers or subscribers.

Microsoft Word <http://www.microsoft.com/office/word/default.htm>

Lotus Word Pro <http://www.lotus.com/home.nsf/welcome/wordpro>

WordPerfect <http://www.corel.com/Office2000>

Spreadsheets

- A spreadsheet program (such as Microsoft Excel) allows you to work out a company's income, expenditure and then calculate the balance. It enables you to make 'what if' type projections of how the company will fair in the future and to forecast how changes in prices will affect profits.

Microsoft Excel <http://www.microsoft.com/office/excel>

Lotus 123 <http://www.lotus.com/home.nsf/welcome/lotus123>

Databases

- A database program (such as Microsoft Access) allows you to compile information and then to search this information to extract just the information you require. For instance, if you have a database of all the equipment housed within an office you can very simply produce a report listing only the equipment above a certain value.

Microsoft Access <http://www.microsoft.com/office/access>

Lotus Approach <http://www.lotus.com/home.nsf/welcome/approach>

Presentation

- A presentation program (such as Microsoft PowerPoint) allows you to produce professional looking presentations, which can be printed out directly onto slides for use with an overhead projector. Alternatively, you can display your presentations directly on a computer screen or via a computerised projector.

Microsoft PowerPoint <http://www.microsoft.com/office/powerpoint>

Lotus Freelance <http://www.lotus.com/home.nsf/welcome/freelance>

Accounts / Payroll

- In most large organisations, the accounts are maintained by a computerised system. Due to the repetitive nature of accounts, a computer system is ideally suited to this task and accuracy is guaranteed.

Sage software <http://www.sage.com>

Web browsing

- Applications used to view and interact with the World Wide Web (WWW).

Microsoft Internet Explorer <http://www.microsoft.com/ie>

Netscape Navigator <http://www.netscape.com>

Mozilla Firefox <http://www.mozilla.org/products/firefox>

Web authoring

- These applications allow almost anyone to create a web site, quickly and easily.



Microsoft FrontPage: <http://www.microsoft.com/frontpage>

Macromedia Dreamweaver: <http://www.macromedia.com>

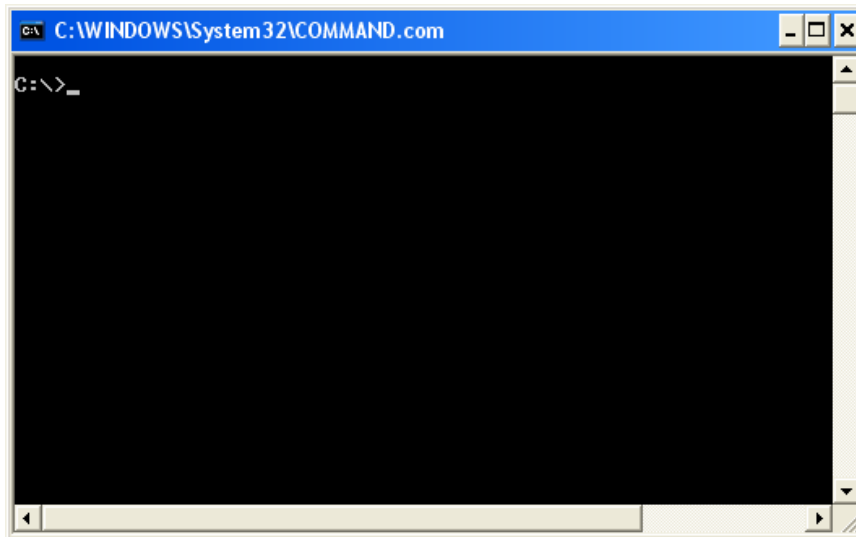
1.3.4 Graphical User Interface (GUI)

1.3.4.1 Understand the term Graphical User Interface (GUI).

What is a Graphical User Interface?

- A Graphical User Interface (GUI) is simply an additional part of the operating system which displays windows and drop down menus, and also enables you to drive your computer using a mouse. Examples of operating system which use a GUI include Windows and IBM's OS/2.

If you used an old operating system like the original version of DOS, there was no GUI and the screen would look like this.



As you can see there are no menus, no icons and nothing for the mouse to click on. You had to know a special language which you then typed into the computer to make it do anything!

The advantages of using a GUI (Graphical User Interface)

- All programs look similar and when you switch from a program supplied by one manufacturer to a different program supplied by another manufacturer, you will find the transition very easy.

- Application programs work in the same way as the underlying operating system, and also look very similar, which means that they are easier to learn and use.
- The GUI also allows programmers to easily write consistent looking programs.

1.3.5 Systems Development

What is systems development?

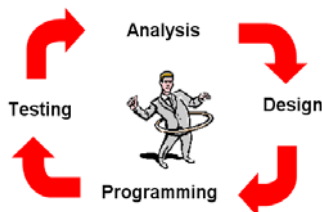
- This is a general term used to describe the way new software is specified, written by programmers, tested and then delivered to the user.

1.3.5.1 Understand how computer-based systems are developed. Know about the process of analysis, design, programming and testing often used in developing computer-based systems.

What is a systems development cycle?

- Most IT projects work in cycles. First, the needs of the computer users must be analysed. This task is often performed by a professional called a 'Systems Analysts' who will ask the users exactly what they would like the system to do, and then draw up plans on how this can be implemented on a real, computer based, system.
- The programmer will take the specifications from the Systems Analyst and then convert the broad brushstrokes into actual computer programs. Ideally at this point there should be testing and input from the users so that what is produced by the programmers is actually what they asked for.
- Finally, there is the implementation process, during which all users are introduced to the new systems, which often involves an element of training.
- Once the users start using the new system, they will often suggest new improvements and the whole process is started all over again. These are methodologies for defining a systems development cycle and often you will see four key stages, as detailed below.

- Analysis
- Design
- Programming
- Testing



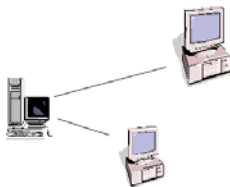
1.4 Information Networks

1.4.1 LAN and WAN

1.4.1.1 Understand the terms, local area network (LAN), wide area network (WAN). Understand the term client/server.

What is a LAN (local Area Network)?

- A LAN (Local Area Network) is a system whereby individual PCs are connected together within a company or organisation. For instance if ten people are working together within an office it makes sense for them all to be connected. In this way, the office can have a single printer and all ten people can print to it. In a similar way, other devices such as modems or scanners can be shared. Even more useful is the ability to share information when connected to a network.

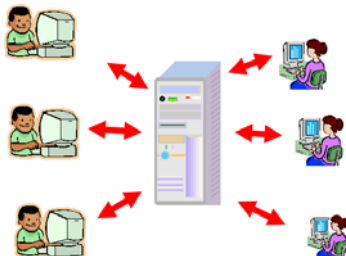


What is a WAN?

- A WAN (Wide Area Network) as the name implies allows you to connect to other computers over a wider area (i.e. the whole world).

What does client/server mean?

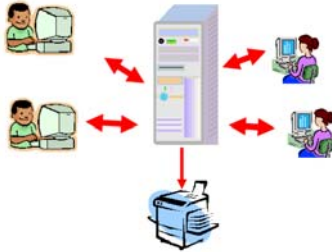
- This term relates to the type of network where resources are kept centrally on the server and used locally by the client. The server tends to be a very powerful PC (or group of PCs), while each client workstation, which the users have, is less powerful.



1.4.1.2 List some of the advantages associated with group working such as: sharing printers, applications, and files across a network.

What is workgroup computing?

- The idea of a workgroup is that groups of people working together can share their resources with each other. People within the workgroup can share information on their hard disks as well as sharing printers, modems and scanners. The workgroup is connected via a computer network. This network can simply consist of a few computers at a single location physically connected to each other via a network cable, or it may be a workgroup of computers connected globally via the Internet. The networked nature of computers means that the physical distance between workgroups members is fast becoming irrelevant.



- Many programs are designed to be used within a workgroup. For instance when using a word-processor you may use what are called templates. Your organisation might want to use a standard Fax header sheet. If a template for this header sheet is held on a single computer but available to all the other computers then this has the advantage that when you need to make a change to the Fax header you only have to change one file, rather than change the files on each computer.

Advantages of workgroup computing

- As there is no reliance on a central computer, there is less chance of major disruption if one computer goes down for a while.
- Provided members of the workgroup have the authority and access rights, they can share data on a temporary basis with colleagues, as required, without the need for a network administrator to get involved.
- In small offices there may be no need for a dedicated network administrator, and this can result in considerable cost savings.

Disadvantages of workgroup computing

- If you share files on your PC with many other people, this can slow down the running of your PC.
- The security of the computer network may not be as good as the traditional client/server network arrangement.
- You may give total access to the files on your PC, which may then be damaged or even deleted, by other members of the workgroup.

1.4.2 Intranet, Extranet

1.4.2.1 Understand what an Intranet is and understand the distinction between the Internet and an Intranet.

What is the difference between the Internet and an Intranet?

- An Intranet is a smaller, closed version of the Internet, which can only be accessed by authorised members of an organisation. Intranets are becoming an increasingly popular way to share information within a company or other organisation. An Intranet uses Internet technologies to allow users to access company documents, search databases, schedule meetings and of course send emails. Once a company has installed a comprehensive Intranet many users need only one piece of software on their PC, a web browser.

1.4.2.2 Understand what an Extranet is and understand the distinction between an Intranet and an Extranet.

What is the difference between an Intranet and an Extranet?

- An Extranet is an Intranet which is partially accessible to authorised outsiders. An Intranet is normally only accessible by members of the same company or organisation; an extranet also allows outsiders who have been issued with a password to gain limited access to information held on a company network. Extranets are being used as a way for business partners to share information.

1.4.3 The Internet

What is the Internet?

- A collection of networks started by and for the US military to enable them to 'survive' a nuclear war. Later adopted by the educational system, and now exploited by the commercial world.

1.4.3.1 Understand what the Internet is and know some of its main uses.

What is the Internet and how is it useful?

- The Internet is a global network of interconnected networks. The unique thing about the Internet is the sheer amount of information which you can access from it. Whatever your interest, you can search for and find information on the most obscure topics. For research the Internet is an incredibly valuable tool. Whether you are gathering information about a rival company on the other side of the world, or are looking for information about your family tree, you will find there is plenty of information available. If you publish material on the Web, it can be accessed by everyone on the Web (providing they can find it.). As a marketing tool, this has interesting possibilities. It is possible for a small company to sell products and services worldwide, without the need for a single sales-person. These days the problem is often not finding information but rather dealing with the sheer amount of information which is available. Also, you have no idea how accurate or up to date a lot of the information you access really is.

More information about search engines: <http://www.searchenginewatch.com>

1.4.3.2 Understand what the World Wide Web (WWW) is and distinguish it from the Internet.

What is the difference between the World Wide Web (WWW) and the Internet?

- The World Wide Web (WWW) is just a small part of the Internet as a whole. The Internet relates to all the hardware and software involved, as well as the WWW, it also includes FTP (File Transfer Protocol), email and newsgroups. The WWW is basically the text and pictures which you can view using your web browser, such as Microsoft Internet Explorer, or Netscape Navigator.

1.4.4 The Telephone Network in Computing

1.4.4.1 Understand the use of the telephone network in computing. Understand the terms Public Switched Telephone Network (PSTN), Integrated Services Digital Network (ISDN), Asymmetric Digital Subscriber Line (ADSL).

How is the telephone line used in computing?

- If you use a modem to connect to the Internet, then this connection is made via the telephone network.

Where to get help about technical terms

- Check out an excellent site, which you can find at:
<http://www.webopedia.com>



What is PSTN?

- PSTN (or Public Switched Telephone Network) is the technical name for the public telephone system. It is based on traditional 'copper wire' technology and can transmit analogue voice data.

What is PSDN?

- PSDN (or Public Switched Data Network) is simply the technical name for the telephone system in use today.

What is ISDN?

- Stands for "Integrated Services Digital Network." ISDN dates back to 1984, and allows much faster transfer rates than when using modems. Using ISDN, you can transfer 64 Kbit or 128 Kbit of data per second.

What is ADSL?

- Short for 'Asymmetric Digital Subscriber Line'. A more recent technology which allows more data to be sent over existing copper telephone lines, but requires a special ADSL modem.
- ADSL allows data transfer rates of ranging from 0.5 to 8 Mbps when receiving data (called the downstream rate) and from 16 to 640 Kbps when sending data (called the upstream rate).

What is DSL?

- Refers collectively to all types of '**Digital Subscriber Lines**', the two main categories being ADSL and SDSL. DSL technology allows faster data transfer while still using copper wires (as opposed to optic fibre cables).

1.4.4.2 Understand the terms analogue, digital, modem, transfer rate, (measured in bps – bits per second).

Digital vs. analogue

- A digital system uses 1 or 0 to transmit data or to represent data. Thus, a digital clock will display whole seconds, whole minutes and whole hours. An analogue system, such as a traditional clock, does not use multiples of 1 or 0, but rather uses the full range of numbers, including fractions. In this way, an analogue clock can display fractions of a second.

Modem

- Modem stands for "MODulate/DEModulate". The modem sends information from your computer across the telephone system. The modem at the other end of the phone line, converts the signal back into a format which can be used by the receiving computer.

Baud rate

- The baud rate tells you how fast a modem can send/receive data. Most modern modems have a maximum baud rate of 56 Kilobits per second (Kb/sec).

1.5 The Use of IT in Everyday Life

1.5.1 Computers at Work

1.5.1.1 Identify some situations where a computer might be more appropriate than a person for carrying out a task and where not.

Where computers might be more appropriate than people

- **Repetitive tasks:** In the past, many repetitive jobs were performed by low skilled, poorly paid workers. Now is it more common to use computers instead.
- **Easily automated tasks:** The phone system is now largely automatic, while in former times all calls were made through an operator. Many other examples exist. How many can you think of?
- **Mathematical calculations:** A computer is ideally suited to performing mathematical calculations. Before computers were widely available accountants used to work on manual, paper-based spreadsheets. Within a spreadsheet, a common task would be adding up a column of figures, and then taking the total, which is added to other columns of figures. If you change one number within a column which is being summed, there can be a knock-on effect on many other calculations within the spreadsheet. Re-calculating a spreadsheet could take hours (or days). On a computer, this re-calculation can take seconds.
- **Dangerous situations:** Monitoring of polluted or radioactive environments is suited to computer-based robots, where the use of a human would expose that person to unacceptable risks. Unmanned, computer-controlled machines almost exclusively carry out serious space exploration. A recent exploration of Mars involved a computerised 'car', which had to make decisions on its own. It could not be remotely controlled from earth, as the time taken for the signal to reach Mars is just too long.

Where people might be more appropriate than computers

- Computers have their limits (how do Daleks from the TV series "*Dr Who*" cope with stairs?)
- When you are unwell and visit your doctor, it is often a person to whom you want to talk, as there might well be other factors affecting your health (maybe personal problems) which you would not feel happy typing into a computer, but would feel comfortable describing to your local doctor, whom you may well have known for years. In most of the caring professions, the same is true, whether it be doctors, nurses or social workers. The human touch is important.
- Despite the uptake of e-commerce, (selling on the Net, banking on the Net and so on), there are many people (myself included) who still like to have the option of a real person to whom you can talk, be it the local bank manager or a real person on the end of a telephone sales line. Does anyone like ringing a large organisation and being greeted with a range of buttons to press, in order to communicate with a computerised telephone system? Even ordering cinema tickets can now involve a lengthy phone call, listening to

a synthetic voice describing many films you do not want to see, and pressing many buttons.

- For many years, science fiction has portrayed images of a thinking, sentient android (Lieutenant Data from Star Trek for instance). In reality this is a long way from present capabilities and when it comes to anything requiring creative thought, a human wins every time. Computers in their present form would gain little from studying philosophy for instance. They can memorise the facts, but cannot make the creative leaps which humans can. On a more mundane level, when it comes to even a simple task such as cleaning your home, a human can deal with mess, clutter and items (such as chairs) which have changed their position recently. Even this simple task is beyond a small computer.
- Computers are very bad at recognising and interpreting shapes. They can take photographs and record images on video, but they have no understanding of the meaning of shapes, and will be easily confused when presented with two overlapping shapes. The human process of pattern recognition, as recent research had demonstrated, is vastly more complicated than we used to think. For these reasons it is humans, not computers who will examine tissue smears for signs of abnormality within hospitals.
- In time things may change, it was not very long ago that a computer was incapable of beating a chess grand master.

1.5.1.2 Know some of the uses of large-scale computer applications in business such as: business administration systems, airline booking systems, insurance claims processing, online banking.

Examples of large scale computer applications in business

- **Business administration systems:** The classic use of a computer is to run business administration systems, and all aspects of this have now been computerised.
- **Airline booking systems:** Airline booking systems have long been computerised. This maximises profit for the airline companies and is often more convenience for the customer. Many of these airline-booking systems have now also been integrated with online airline ticket sales.
- **Insurance claims processing:** All insurance companies use very large mainframe computers, combined with specialist software to manage their business. The software involved can handle all aspects of claims procedures. As with many large-scale systems, some insurance companies have invested in over ambitious computerisation and there are numerous examples where many millions have been wasted over the years.
- **Online banking:** Most banks now offer some form of online banking. This has the advantage to the bank that costs can be reduced. Some banks are completely online, with no physical branches at all. The customers benefit from 24-hour access to banking services. The downside is that this leads too many job losses in the banking industry and when things go wrong there is no physical person you can go and see and make your complaints to. Some leading banks have demonstrated a degree of incompetence when it comes to the security of their online systems and many people are very reluctant to trust online banking systems yet.

Smile: <http://www.smile.co.uk>

Egg: <http://www.egg.co.uk>

1.5.1.3 Know some of the uses of large-scale computer applications in government such as: public records systems (census, vehicle registration), revenue collection, electronic voting.

Uses of large scale computers applications within government

- **Census:** Every few years census details are taken and entered into large computer databases. This data can then be used to extract useful information and predict trends. In some cases this data is also being made available online, so that it becomes even more accessible and useful.
- **Vehicle registration:** All car and lorry details are kept centrally; this makes it easy to find the owners of cars, which can be useful for police, customs and security services.
- **Revenue collection:** Increasingly aspects of government revenue collection are being computerised, which in many cases involves online systems as well.
- **Electronic voting:** Governments are experimenting with online voting systems, often in response to appallingly low voter turnout. Security remains the main obstacle to the extension of this idea.
www.ukonline.gov.uk

1.5.1.4 Know some of the uses of large-scale computer applications in hospitals/healthcare such as: patient records systems, ambulance control systems, diagnostic tools and instruments, specialist surgical equipment.

Uses of computer applications within hospitals and the health care system

- **Patient record systems:** Appointment and record systems are computerised and centralised. This means that doctors at one location can access medical records from another location. The results of tests can be emailed rather than being posted, which speeds up treatment.
- **Ambulance control systems:** Ambulances are often centrally controlled and the computer systems can now integrate satellite positioning to pinpoint the location of each ambulance. In times of large scale disasters, ambulances from different regions can be coordinated.
- **Diagnostic tools and specialist surgical equipment:** The modern intensive care facility is filled with computerised diagnostic equipment. Even the doctor's surgery is increasing being taken over by computers, which will monitor heart rate, blood pressure etc.

1.5.1.5 Know some of the uses of computer applications in education such as: student registration and timetabling systems, computer-based training (CBT), distance learning, homework using the Internet.

Uses of computer applications in education

- **Student registration and timetabling:** There are many specialist programs designed to computerise these otherwise time consuming tasks.
- **Computer Based Training (CBT):** Computer Based Training (CBT) offers a low cost solution to training needs where you need to train a large amount of people on a single subject. These programs are normally supplied on CD-ROM / DVD and combine text, graphics and sound. Packages range from general encyclopaedias right through to learning a foreign language. As an alternative to training via CD-ROM / DVD, CBT can also be delivered via the Internet.
- **Using the Internet as a homework resource:** The Internet is the ultimate resource for getting the information necessary to complete a student's homework. The Internet can also be used to set and collect homework (via email).
- **Distance learning systems:** E-learning is a term used to describe studying via the Internet. It can take many forms ranging from a simple web version of printed books, through to advanced use of video images with sound. In many cases there can be real-time two-way communication between the teacher and the student.

Advantages include:

- One trainer can train many people at many different locations.
- If the training is solely computer based, then the students can work at their own pace, and repeat parts of a course which they do not understand. Also the teaching can be at any time, 24 hours a day, 7 days a week.
- Often e-learning solutions are cheaper to provide than other more traditional teaching methods.

Disadvantages include:

- There may be no opportunity to ask a question of a real person.
- The Internet connection may temporarily fail for some reason.
- You may have to pay for the connection time, by the minute.
- The download speed may be too slow for some forms of e-learning
- Because of the increased time required to produce some types of e-learning packages, the e-learning tutorials may not be available for some time following the release of a new version of software, or a new certification syllabus.

1.5.1.6 Understand the term tele-working. List some of the advantages of tele-working such as: reduced or no commuting time, greater ability to focus on one task, flexible schedules, reduced company space requirements. List some disadvantages of tele-working such as: lack of human contact, less emphasis on teamwork.

What is tele-working?

- Tele-working is a broad term which refers to people working at home connected to the rest of the organisation via a computer network. Communication is via email or the telephone. This arrangement has advantages and disadvantages to both the employer and the employee.

Some of the advantages of tele-working

- Advantages include:

Reduced or zero commuting time.

This saves time (and money) for the employee and reduces environmental overheads, as less commuting means less car pollution. It means that the employee does not arrive at work already stressed from car jams or late train connections.

Greater ability to focus on one task:

As there are fewer interruptions from low priority phone calls, there is a greater ability to concentrate and focus.

Flexible schedules:

In many cases, as long as the job gets done, it does not matter when the job gets done. This means there is time for other activities, such as picking up the kids from school. It also means that work can be finished in the evening if required. If it is a beautiful day, why not take advantage of the weather, and finish your work later.

Reduced office desk space requirements:

The cost of Office space can be very high and tele-working can help to reduce these costs if a proportion of the staff work at home. "Hot Desking" is a term used to indicate that people do not have a desk dedicated to their exclusive use. People simply sit at any desk and log on to the networked computers using their own ID, which will allow them to uniquely access their own work stored within the computer system. Hot Desking is popular where staff spend a proportion of their time working at home, or at sites outside the main office complex.

Some of the disadvantages of tele-working

- As well as advantages, there are many disadvantages for tele-workers, which include:

Lack of human contact:

Many people cite this as the single biggest factor when switching from a regular office job, to tele-working. In fact many companies now arrange company gossip networks, just so that people can keep in touch.

Negative impact on teamwork:

If you never see the rest of the team it is hard to feel part of the team. To some extent this is offset by video links and by occasional get-together meetings.

Self-discipline:

It can take a lot to work from home and remain focused on work. It is all very well saying 'I will take the afternoon off and work this evening', but come the evening you may not feel like working.

Possible Employee Exploitation:

If workers are isolated from each other there is the possibility for companies to take

advantage. Some large companies using tele-working restrict trade union activity (or if they can, ban it altogether).

1.5.2 Electronic World

1.5.2.1 Understand the term electronic mail (e-mail) and know its main uses.

What is email?

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

1.5.2.2 Understand the term e-Commerce. Understand the concept of purchasing goods and services online, including giving personal details before a transaction can be carried out, payment methods, consumer's basic right to return unsatisfactory goods.

What is E-commerce?

- The phrase e-commerce is a buzzword which relates to buying or selling via the Internet. Increasingly you can purchase directly via a Web site by selecting the goods or services which you require and entering your credit card details. When you send your credit card details these SHOULD be encrypted by the site operators so that no one can intercept your details. Most sites which accept credit card payment are on secure services and your Internet browser program (i.e. Microsoft Internet Explorer or Netscape Communicator) will normally inform you (via a popup) when you are entering or leaving a secure server.

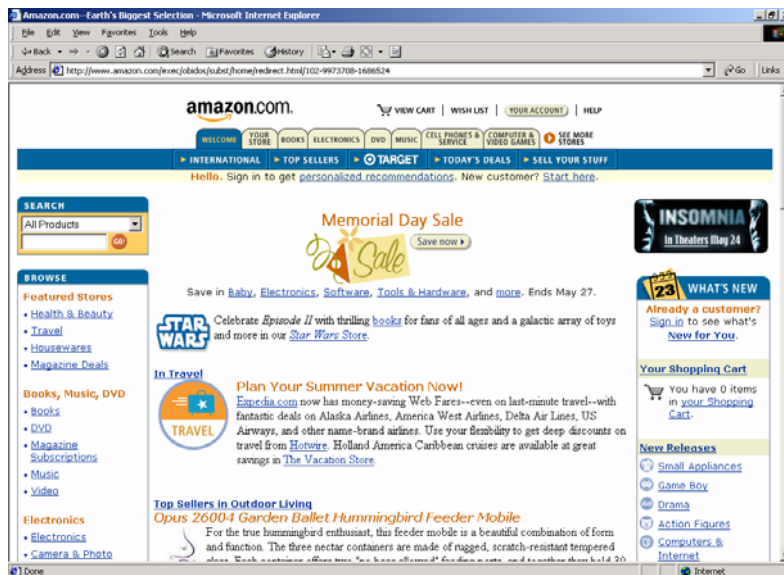
What is E-banking?

- The phrase e-banking relates to managing your money online. Instead of having to go to the local branch, or telephoning them, you can pay your bills online and move money from one place to another. Some online banks have no physical branches at all, making it a very profitable operation for the bank. There are security considerations relating to online banking, with numerous examples of poor security coupled with sloppy operations.



The process of shopping online

- There are numerous web sites from where you can purchase online, the most famous of all being amazon.com as illustrated. Most Internet based shopping sites use a virtual “shopping cart” system. As you browse the site you can add any products you want to purchase to your cart. Once you have placed items in the cart you can then move to the checkout stage. At the checkout you enter your name & address, select the type of delivery you want and enter your payment details.



1.5.2.3 List some of the advantages of purchasing goods and services online, such as: services available 24 hours a day, opportunity to view a wide range of products. List some of the disadvantages of purchasing goods and services online such as: choosing from a virtual store, no human contact, risk of insecure payment methods.

The advantages of e-commerce

- There are many advantages using e-commerce:

Services available 24 / 7:

Unlike a normal shop which closes in the evening, you can shop via the Internet 24 hours a day, 7 days a week, and 365 days a year.

Large stock range:

A larger range of stock can be carried than a conventional store. The stock does not have to be distributed and duplicated over many physical stores, but rather it can be held in one central distribution warehouse.

Detailed product information:

A detailed product description for each product, along with a picture can be given. There can even be links to the product manufactures own web site.

Ability to compare prices:

Many sites claim to offer you the very best prices. You can use the information on these sites to compare prices.

Equal delivery to town and country:

The fact that you may live in the countryside, far from the nearest town makes no difference at all when shopping via the Net.

Right to return defective goods:

Most e-commerce web sites will have a 'Returns Policy' and it is advisable to read this prior to purchase. In many cases you will find that the law gives you a right to return defective goods or even goods which are not quite as you expected.

The disadvantages of e-commerce

- Includes the following:

Possible Credit card Fraud:

Some web sites have been set up solely to trick you into providing your credit card details, which can later be sold to criminals so that they can make purchases with your money. When it comes to credit card fraud there is basically one rule 'wherever humanly possible the bank never pays: - someone else does', make sure that someone is not you. Check the small print on your credit card agreement.

Is the web site genuine?:

When you purchase from a company such as amazon.com, you know that the company is well respected, is unlikely to go bust tomorrow, and above all will not attempt to 'run off with your money'. But what about when you purchase online from a company you have never heard of? Look for clues. Is there a client list on the site? How long has the company been trading. Are full contact details provided? If in doubt ring the phone numbers provided on the site and try to decide whether the company sounds genuine. Ask for references from other customers. Just because you see trade association logos on a site, do not assume that the use of these logos is genuine. There are organisations now whose sole purpose is to verify that other web sites belong to honest companies.

What about returning faulty goods?:

If the goods arrive and are substandard, who pays to return them. Where do you return them to? Be sure you know about a company's returns policy, BEFORE you make an online purchase.

How are you covered when you purchase goods from another country?

This is a minefield. Each country may have its own laws relating to consumer protection. Be warned!

Can you talk to a real person?

I recently heard a radio presenter who purchased a computer online, through a very well known PC manufacturer. He purchased the computer for his daughter, in good time for Christmas. As Christmas due near he tried to find out what was happening, but was unable to talk to a real person and was forced to rely solely on email contact with the company. The computer eventually turned up in February. Never buy from a company which does not provide you with full contact details including a telephone number.

1.6 Health and Safety, Environment

1.6.1 Ergonomics

1.6.1.1 Understand what elements and practices can help create a good, working environment such as: appropriate positioning of monitors, keyboards and adjustable chairs, use of a mouse mat, use of a monitor filter, provision of adequate lighting and ventilation, frequent breaks away from the computer.

Good working practices

- Includes the following:

Your chair:

Your chair should be fully adjustable, and be able to be moved up or down. It should have an adjustable back.

Your screen:

Your screen should be fully adjustable so that your eyes are at the same height as the top of the screen. You may wish to use a filter attached to the screen to reduce glare. If the screen is badly focused, too bright or appears to flicker, then get a qualified technician to take a look at it. You should periodically refocus into the distance, as opposed to always gazing at a screen a few inches from your eyes.

Your keyboard:

Use a good keyboard and you may also wish to use a wrist pad to relieve pressure on your wrists.

Your feet:

You may wish to use a footpad to rest your feet while using the computer.

Your mouse:

Use a mouse mat to make the mouse easier to use. Ensure that you have enough space to comfortably use the mouse. If your arms or fingers become tired or painful when using the mouse, take a break and do something else.

Breaks:

Take frequent breaks when using a computer.

Other factors:

Make sure that the area where you are using the computer is adequately lit and well ventilated. Ventilation is especially important if you are using a laser printer, which may produce ozone when printing.

More information:

<http://intranet.linst.ac.uk/student/services/health/computer.htm>

<http://www.ibm.com/ibm/publicaffairs/health/summary.html>

<http://www.ics.uci.edu/~chair/comphealth2.html>

1.6.2 Health Issues

1.6.2.1 List some common health problems which can be associated with using a computer such as: injuries to wrists caused by prolonged typing, eye strain caused by screen glare, back problems associated with poor seating or bad posture.

Using a computer incorrectly can damage your health

- Take regular breaks, have regular eye tests and get a good desk and chair to maintain good posture.

Repetitive Strain Injury (RSI)

- Often referred to as RSI. This is a condition caused by constant use of the keyboard or mouse. You should take regular breaks to help avoid this type of injury. You may want to consider the use of a pad on which you can rest your arms, which will help to some extent.

More information: <http://www.rsi-center.com>

Glare from screens

- You should take regular breaks to avoid staring constantly at the screen and straining your eyes. You should consider using the best (i.e. most expensive) monitor which you or your company can afford. The better the monitor the better the screen resolution and the higher the refresh rate. For detailed work, you should also consider using a large screen rather than the 'standard' 14" or 15" screens which are in common use. In many countries, your employer has a legal duty to pay for eye tests for employees as and when they request it. You can get filters which fit in front of the screen and reduce glare.

Bad posture

- When sitting at your computer you should have a monitor at eye level which can be adjusted to suit you. In addition, you may want to consider a footrest. Neck ache and backache can result from prolonged bad posture.

1.6.3 Precautions

1.6.3.1 List some safety precautions when using a computer such as: ensuring power cables are safely secured, power points are not overloaded.

Make sure that cables are safely secured

- You should always use the power cables which were supplied with your computer or cables of a similar quality. Make sure that the cables are safely secured at the back of the desk and that you have power points located near the desk. If your desk has a cable ducting system make sure that you use it. Avoid long trailing cables as you or other people can easily trip over them and cause injury to yourself or others. Apart from personal injury, accidentally pulling out a power cable could cause your computer to lose power and you will lose data as a result. Network cables tend to be delicate and easily damaged and the most common cause of failure to log onto a network server is that someone has accidentally dislodged or damaged the network cables.

Make sure that power points are not overloaded

- Overloading of a power point is dangerous and a potential fire hazard. If you need more power sockets, have them properly installed by a qualified electrician.

1.6.4 The Environment

1.6.4.1 Be aware that recycling printed outputs, recycling printer toner cartridges, using a monitor which consumes less power while the computer is inactive can help the environment.

Computers and the environment

- You should have a separate bin for paper which can be sent for recycling (be sure that sensitive material is first shredded).

Printer toner cartridges can be sent for recycling; in fact some charities now collect spent toner cartridges, and send them for recycling. You may also wish to consider the use of recycled toners in your printers (but be aware that in some cases this may invalidate the printer's guarantee).

Many monitors and other peripherals will automatically switch into 'sleep' mode after a period of inactivity. This means that even though the computer is still switched on, it will consume less power.

1.6.4.2 Understand that using electronic documents can help reduce the need for printed materials.

Don't Waste Paper

- Where possible the use of on-screen manuals and help systems, rather than printed manuals, will save on the amount of paper consumed. This equates to less trees being cut down.

1.7 Security

1.7.1 Information Security

1.7.1.1 Understand the term information security and the benefits to an organisation of being proactive in dealing with security risks such as: adopting an information security policy with respect to handling sensitive data, having procedures for reporting security incidents, making staff members aware of their responsibilities with respect to information security.

What is information security?

- This is a general term which covers all aspects of computer security. It covers protection against viruses and hackers, password and access control policies as well as procedures for the regular backing up of your data (to guard against computer failure)

Advantages of proactive information security

- A proactive information security policy anticipates problems and attempts to guard against future problems, as opposed to discovering a problem and then trying to deal with the problem 'on the fly'.

Passwords

- If your computer has a password which prevents other users from accessing it then do NOT give this password to anybody else. Do not write the password on a card and prop this up next to the monitor and above all do not attempt to hide your access passwords on the underside of your desk (this is the first place most criminals would look if trying to break into your system). Make sure you do not forget your passwords; in many cases, data cannot be recovered once the password is lost.

The Importance of shutting down your computer

- When you are using a Windows based system it is important to remember that just switching off the computer or losing power due to a power cut (power outage) can cause loss of data. To protect against this you should save your work regularly. Many programs have a facility which automatically saves your work; say every 10 minutes (or any time interval which you specify).
- Some operating systems, such as the later versions of Windows 95 and also Windows NT have a facility which will automatically detect that the computer was not properly shut down the last time it was used. If this situation is detected, then a special recovery program will be run which will attempt to fix any damage caused by the power cut.
- When using Windows 95 or Windows NT, you MUST always use the shutdown command (located on the Start menu) to close down the operating system, before switching off the power.

What is a UPS?

- A UPS (Un-interruptible Power Supply) is a device which you can attach to your computer which will guard against power cuts (or indeed someone tripping over your power cable and pulling the plug out). It contains batteries which will keep your computer alive long enough for you to use the shutdown command and turn off the computer in the proper way. This is especially important for PCs on a network which might provide data for many users on the network.

Electrical surge protection

- The voltage which is supplied to your computer via the power cable can vary from time to time, and there are occasional power surges. Power surge protection devices are readily available and offer low cost protection against these occasional power surges.

Things computers like

- Good ventilation
- Clean environment
- Stable, vibration free surface

Things to avoid

- Dust
- Drinking and eating over the keyboard
- Heat, Cold
- Moisture
- Do not move the system while it is switched on.
- Do not just switch the computer off at the mains. Follow the correct shutdown procedure or data could be lost.
- Do not place objects on top of monitors. This could block the ventilation holes and cause it to overheat.
- Do not place floppy disks near monitors. Monitors produce a strong electromagnetic field, which can damage floppy disks.

What to do if the computer breaks down

- If you are working within a large organisation, you should be aware of the company's policy if the computer suddenly breaks down. Many large companies have a special computer support department and you should make sure that you know how to contact them in case of emergency.

In many smaller organisations, the situation is much less formalised. If you are not qualified to make repairs on the computer, do NOT attempt to open the computer case and investigate. This is especially true of the computer monitor, inside are many components operating at VERY HIGH VOLTAGES, which can kill. If in doubt, get a qualified technician to fix the problem.

- Prior to contacting your computer support staff you may (if authorised by your organisation) check that the various external components, such as the mouse, keyboard, monitor and network connections are in fact properly connected to the back of the computer. A very common complaint to support groups is that the screen is not working.

You may wish to check that someone has not inadvertently switched off the screen, prior to ringing the support group. One of the more common reasons for a network not working is that someone (maybe an overnight cleaner) has accidentally pulled the network cable out of the back of a computer.

Dealing with security problems

- In any organisation there should be clearly defined policies for the detection of security problems, and what to do if a problem is noticed. Security problems may range from the physical presence of unauthorised persons in an office, through to suspicion of attempted unauthorised electronic entry to your computer networks. In all cases you should know whom to contact, and how to contact the relevant person, so that the matter can be investigated further.

Responsibilities for dealing with security problems

- If you are reporting a security problem, you should do so without delay, to the relevant person within your organisation. If you are responsible for dealing with reports of security incidents, you should always take action immediately, and follow the correct procedure within your organisation for investigating any problems.

Security rights and obligations

- If you are working for a large organisation you have both rights and obligations to the organisation. For instance does an employer have the right to video film and record employees without their permission? Can an employer read all email sent and received by employees? Can an employer monitor what Internet sites an employee is accessing? The employer must make clear the security obligations of employees, such as keeping network ID and logon passwords secure and how to report security incidents.

1.7.1.2 Know about privacy issues associated with computers, such as adopting good password policies. Understand what is meant by user ID and differentiate between user ID and password. Understand the term access rights and know why access rights are important.

User IDs and passwords?

- A User ID is normally used to logon to a computer, or computer network. It uniquely identifies you to the network. In addition you use a password which is only known to you. The password guarantees that no one can access the network and impersonate you (in theory). Once you have logged on (i.e. connected) to the rest of your computer network, you will have been assigned access rights to the network. Your network administrator will have defined these access rights. The idea of access rights is that you only have the ability to connect to, or share, devices which you have authority to use. In other words, the network administrators often have access rights to just about every computer, printer, modem etc on the network. You on the other hand may have access rights to print to only certain, specified printers and you may be able to access only certain data held on the network.

Choosing a secure password

- Your password is the only thing which will prevent someone else logging into a computer using your user ID and impersonating you. It is important to choose a password which cannot be easily guessed by other people. Ideally a password should be at least 8 characters long & contain a mixture of words and numbers. It is also recommended that you change your password regularly; some computer systems will require you to change your password periodically.

How secure is your software?

- Microsoft Windows does seem notoriously easy for talented hackers to crack. It seems that there are rather too many 'fixes' which companies such as Microsoft release and then ask you to install to help plug some of the holes in their in-built security. As soon as you connect a computer to a computer network or the Internet your risk of attack increases. Applications are also vulnerable to attack. For instance there are some virus programs which explore security weaknesses within Microsoft Word to spread themselves and infect your computer.

How do you manage data securely?

- Make sure that there is a policy in place for the management of sensitive data, especially if it involves the transmission of the information beyond your organisation. If you are sending a fax or email, be sure that the message contains your contact information, and a message describing the contents as confidential, with instructions for what to do if the recipient has received the message in error. Logs should be kept of all faxes and emails sent and received. Sensitive printed materials should be clearly marked, maybe with a watermark saying **CONFIDENTIAL** or **DRAFT ONLY**.

How do you dispose of data securely?

- **Floppy disks:** If you perform a full re-format on a floppy disk, this will remove the data. However be aware that there are programs available which will undo the effect of this formatting. The only way to be sure that the data is removed is to physically destroy the floppy disk.

Hard disks: If you delete a file, then it is actually only moved to the Recycle Bin. As a first step, empty the Recycle Bin of deleted files. Even where a file appears complete deleted, it can still often be recovered using specialist data recovery programs. Be warned. If you are disposing of an old hard disk which used to contain sensitive data, the safest way is to crush it.

Tape backups and removable drives (ZIP and JAZ drives): Apart from file deletion, physical crushing of the media is the only totally safe way to guarantee that your data remains secure.

Old Computers: When disposing of old computers, remove all data storage media and crush them.

Paper output: Always put unwanted paper output through a paper shredder, prior to disposal.

What is visitor control?

- When you let visitors into your building, they should always sign in. This is vital for fire regulations, so that you know exactly who is in a building, in case of emergency.
- You can issue electronic badges to visitors. This often allows the movement of visitors to be monitored electronically by your security staff. It can also be used to allow access to certain areas of the building, but deny access to more sensitive areas.
- Electronic passes can also be used to control which members of staff have access to which area of your building.

1.7.1.3 Know about the purposes and value of backing up data software to a removable storage device

Why do you need to back up your computer?

- The most important thing which you store on your computer is information. Often the contents of a hard disk can represent years of work. If the hard disk stops working one day you could lose all those years of work. For this reason it is VITAL that you take regular backups of the information which is stored on the computer. In large organisations this backup procedure is normally performed automatically by your computer support team, where the data is normally held on a centralised, networked computer.

In smaller organisations, it is often up to the individual to organise some sort of data backup. If nothing else is available, copy your files to a floppy disk and make sure that these backup disks are stored away from the computer, ideally off-site. If there is a fire and your office burns down, if your backup disks are stored next to the computer they too will be incinerated.

Organising your computer for more efficient backups

- When you think about it, you have a computer containing many programs and also a large amount of data which you have created, then it is only the data which really needs to be backed up. If you create a folder structure which contains only data then only this directory (plus any sub-directories of this directory) needs to be backed up.

Complete vs. incremental backups

- A complete backup means which you backup all the data on your computer. This has the advantage that the entire hard disk can be backed up, but suffers from the disadvantage that this process can take a long time if your computer contains a lot of data. An incremental backup means that once a week you can perform a complete backup, but every night for the rest of the week, you only backup files which have been newly created or modified since the last backup, saving time. With the right backup software, this process is automatic, and normally you only have to select full or incremental.

Why you should use 'off-site' storage?

- It is no good backing up your data only to leave the item which you backed up to next to the computer; if someone steals your computer it is likely that they will also steal your backups too. If you have a fire, then again you will lose your backups if the backups are stored next to the computer. Ideally, backups should be stored off-site at a safe location.

At the very least, consider storing your backups in a fireproof safe, which will give some protection against fire damage.

Beware of 'open files'

- You should perform backups at night. If you backup your computer during the day (when you are using programs on the computer) then any program or data files which are in use at the time of the backup will not be backed up. The backup program will skip these 'open' files.

1.7.1.4 Be aware of possible implications of theft of a laptop computer, PDA, mobile phone such as: possible misuse of confidential files, loss of files, loss of important contact details if not available on a separate source, possible misuse of telephone numbers.

What if your laptop is stolen?

- If there was no start-up password then all the data on the computer could be at risk. The same goes for important/sensitive documents; if these were not individually password protected they could also be vulnerable. If you work within a large organisation, always report an incident of this type immediately to your technical support department.

What if your mobile phone is stolen?

- Call your technical support department if working for a large organisation. If you work alone, then call the phone network operator and report the phone as stolen.

1.7.2 Computer Viruses

1.7.2.1 Understand the term virus when used in computing and understand that there are different types of virus. Be aware when and how viruses can enter a computer system.

What are computer viruses?

- Viruses are small programs which hide themselves on your disks (both diskettes and your hard disk). Unless you use virus detection software, the first time that you know that you have a virus is when it activates. Different viruses are activated in different ways. For instance, the famous Friday the 13th virus will activate only when it is both a Friday and the 13th of the month.

BEWARE: Viruses can destroy all your data.

How do viruses infect PCs?

- Viruses hide on a disk and when you access the disk (either a diskette or another hard disk over a network) the virus program will start and infect your computer. The worst

thing about a computer virus is that it can spread from one computer to another, either via use of infected floppy disk, or over a computer network. The Internet allows you to access files from all over the world and you should never connect to the Internet unless you have a virus-checking program installed on your computer. It is vital to keep your virus monitoring software up to date. Many anti-virus programs, such as Norton Anti Virus allow you to update the program so that the program can check for recently discovered viruses.

More Information:

McAfee Anti-virus software <http://www.mcafee.com>

Norton Anti-virus software <http://www.symantec.com/avcenter>

Dr Solomon anti-virus software <http://www.drsolomon.com>

How to prevent virus damage

- There are a number of third party anti-virus products available. The main thing about your virus checker is that it should be kept up to date. Many companies supply updated disks on a regular basis or allow you to receive updates automatically via the Internet.

To make a diskette read-only

- If you are using 3 1/2" diskette (floppy disk), there is a notch which can be opened or closed which may be used to protect the disk. To protect the contents of the disk move the notch to the open position (you should be able to see through the hole).

To password protect your computer

- You can set a power-on password on your computer. The mechanism for setting this will vary from one computer to another, and is determined by the makers of the computer, rather than by Windows. The advantage of a power-on password is that the computer will not boot to Windows until you supply the correct password. This means that no one else can play around with your computer and in the process accidentally infect it with a virus.

1.7.2.2 Know about anti-virus measures and what to do when a virus infects a computer. Be aware of the limitations of anti-virus software. Understand what 'disinfecting' files means.

How do you protect computers from attack?

- The safest way to use a computer is to not connect it to a Local Area network or the Internet. This is called a 'stand-alone' computer, providing that you do not use floppy disks on that PC which have been used in other computers, this type of computer is virtually immune from any form of intrusion.
- Unfortunately it is the ability to connect to other computers or indeed the Internet, which makes the modern computer so versatile and so useful.
- Always make sure that all computers require an ID and password to access them. Make sure that all relevant 'security patches' from Microsoft have been applied.

- Make sure that the password is long enough, contains a random mixture of numbers and letters, and that the passwords are changed on a regular basis.
- There are many examples, where people have used passwords which relate to something personal, such as a partner's first name, the dog's or cat's name, etc. For a determined, serious computer hacker, these are easy to guess. If you have a system, where lots of different passwords are required to access the system, then security often breaks down and computer users will sometimes keep a list of these passwords in their disk. This defeats the whole object. If you forget your network access password, the network administrator should be able to assign you with a new one.

What to do if you discover a virus on your computer

- If you discover a virus on your computer don't panic. If your virus checker alerts you to a virus, then the chances are that it has caught the virus before the virus could infect your computer and cause damage. For instance you may insert a diskette into your computer and the virus checker should automatically scan the diskette. If the diskette contains a virus, a message will be displayed telling you that the diskette is infected, and it should automatically remove the virus. The other common method of infection is via emails.
- If you work within a larger company, you should have a company IT support group which will come and rid your computer of viruses. Be sure that you are familiar with your company's policy regarding viruses.

The limitations of anti virus software

- Anti virus software can only detect viruses (or types of viruses) which the software knows about. As such it is vital that you keep your anti virus software up to date so that it can detect new viruses which are constantly appearing.

What is virus disinfecting?

- Running a virus checker on a machine which contains a virus is known as disinfecting the PC, as the virus program will detect, and then eliminate the virus.

1.7.2.3 Understand good practice when downloading files, accessing file attachments, such as: use of virus scanning software, not opening unrecognised e-mail messages, not opening attachments contained within unrecognised e-mail messages.

Anti-virus Precautions

- You should have an anti-virus program installed on your computer. This should be updated on a regular basis, so that the anti-virus program is aware of new viruses which are in circulation. Even the best anti-virus program will only offer protection against known viruses or viruses which work in a particular way. New types of viruses are constantly being developed which may attack your computer in new and novel ways. Your anti-virus program may not be able to defend you against every possibility. Be warned, if you are connected to a Local Area Network (LAN), or to the Internet you are vulnerable.

Make sure that your virus checker is configured so that as well as scanning your computer for viruses when you first switch on your PC, it remains active in the computer's background memory, constantly looking for signs of virus attack. This is very important when connecting to the Internet.

Take care when opening emails:

Be very cautious about opening unsolicited emails, especially if they contain file attachments. A good anti-virus program should detect most threats from virus-infected emails.

Beware of Internet Downloads:

Any file which you download from the Internet may in theory contain a virus. Be especially careful about downloading program files (files with a file name extension of .COM or .EXE). Microsoft Word or Excel files can contain macro viruses. Basically trust no one when it comes to downloading files. Do not connect to the Internet unless you have a good anti-virus program installed on your computer.

1.8 Copyright and the Law

1.8.1 Copyright

1.8.1.1 Understand the concept of copyright when applied to software, and also to files such as: graphics, text, audio, video. Understand copyright issues involved in downloading information from the Internet.

Software Copyright Issues

- Most programs which you purchase are copyrighted and you must not copy them. If you do so you may be breaking the law and if caught, you could find yourself being prosecuted. Many people will buy a copy of a game and make a copy for their friends or other family member. This is also normally unlawful. Even lending your program disks or CD-ROM to other people may be breaking the law in most cases. There are numerous organisations, such as FAST (the Federation Against Software Theft), which are dedicated to preventing the illegal copying of software. In a business situation, if your manager tells you to copy software, ALWAYS first make sure that you have a licence which entitles you to copy the software, because in many countries, you will be personally liable for damages.
- Most text which you will find on the Internet is copyrighted. Never copy text without authority to do so and always quote your sources.
- There are many sites offering free graphics and clipart. Some are genuine and have the authority to offer you a free download of images. Many sites however may not have this authority. Popular examples are pictures, sound clips, or movie clips from Star Trek. If you visit the official Star Trek site (www.startrek.com) you will see that use of images, and even the name 'Star Trek' is protected and may not be used on 'fan sites'. Even downloading sound clips to replace the bleeps which Microsoft Windows makes is often illegal. Some sites even allow the 'free' download for complete films or music tracks. If you can download a film for free before it is even officially available on video/DVD, it is a pretty good bet that the site is unauthorised. Cover yourself. Get written permission to use downloaded materials and 'if in doubt - don't' is the safe rule. Because CD-ROM writers have become so widely available, it has become possible to copy entire CD-ROMs which can contain software, games or data. Do not do this. Always be careful of software which you may find advertised at very cheap prices, it may be illegally copied.

More Information: The Federation Against Software Theft <http://www.fast.org.uk>

What are site licences?

- Many large companies do not go out and buy a certain amount of 'shrink-wrapped' copies of each software product which they need, instead they will buy a site licence. These site licences are different in their small print, but generally mean that the companies purchasing the licence can make a fixed number of copies available to their staff, normally via a company network.

1.8.1.2 Understand copyright issues associated with using and distributing materials stored on removable media such as CD's, Zip disks, diskettes.

Copyright Issues

- **Transferring files across a LAN:**
You need to be careful that you do not accidentally make copies of software via your Local Area Network (unless of course you are authorised to make such copies).
- **Downloading files from the Internet:**
You need to be VERY careful when downloading files from the Internet. Just because a site may say you are free to download materials from the site, does not necessary mean that the owners of the Internet site have the authority to allow you to do this. It is possible to download entire software packages from the net, even entire movie films. In many cases however it is not legal to do so.
- **Copying diskettes / CD-ROMs / DVD / ZIP disks:**
If you purchase software, you may, in some cases be allowed to make a single, backup copy of disk. You are not allowed to distribute copies to family and friends. You are certainly not allowed to copy and re-sell commercial software.
- **Freeware:**
This is software which can be copied or downloaded for free. It is often fully functional. Examples may include software developed by organisations such as Universities, where the aim was not to profit from the software. It is very important not to confuse freeware and shareware.
- **Shareware:**
This is where you can use software for a free trial period. Sometimes the shareware versions may be fully functional, but after a time period will either start to display an annoying message, asking you to register (i.e. pay for) your software, or in some cases it may stop working altogether after the trial period. This 'try before you buy' method of getting software is becoming increasing popular with the major software suppliers.
- **User Licences:**
If you have more than one PC, then you can either purchase a separate copy of the software you require for each PC, or better: you can purchase a user licence. This user licence allows you to make copies and install them on each computer. The more copies you make the more the user licence will cost, but the cheaper the effective cost per PC.

1.8.1.3 Know how to check the Product ID number for a software product. Understand the terms shareware, freeware, end-user licence agreement.

How to check a software Product ID

- Normally if you click on the **Help** drop down menu within an application, there will be a command such as **About**. Clicking on this option will often display your software product identification number.

What is freeware?

- Some software is made freely available. Demonstration disks often come under this category. In addition, a lot of software is produced by the educational community and is made freely available. Always read any licences supplied with such software very carefully before use.

What is shareware?

- Shareware is software which is freely available and is designed to let you use the product for free, for a limited period while you decide if you like it or not. After this period, you must legally either remove it, or pay an amount to the producers of the product.

More information: <http://shareware.cnet.com>

What about software which you find on the Internet

- There are some sites on the Internet run by dubious organisations which might make copies of commercial software freely available. If you download any software from the Internet, make sure that it is legal.

What is an end-user licence agreement?

- Normally when you install software these days there is a step within the installation routine in which you have to agree to be bound by the end user licence agreement. This agreement can be very large and is drawn up to protect the manufacturers of a product from being prosecuted due to faulty software. It also defines how many copies of the software you are entitled to. I recently printed out a Microsoft end user agreement and it was over 15 pages long.

1.8.2 Data Protection Legislation

1.8.2.1 Know about data protection legislation or conventions in your country. Understand the implications of data protection legislation for data subjects and data holders. Describe some of the uses of personal data.

Data Protection and Privacy Issues

- If your computer system holds information about individuals, then you have a moral and legal duty to treat that information with respect. For instance if a police force computer is used by unscrupulous people to gain unauthorised information about a person's private life, that would be a clear breach of trust. In the same way doctors, government departments and credit agencies often hold vast amounts of information about the general public, which is both sensitive and private. In a free society you have the right to ensure that the information held about you is not abused. In many countries, this right is enshrined under data protection laws.

Data Protection Legislation

- Listed below are the main principles of the UK Data Protection Act. This is meant as an illustration only and should NOT be used for determining liability or operating principles. You must read the full details of the act if you are considering legal implementation. For more information about the UK data protection act please access the following Web sites:

<http://www.hmso.gov.uk/acts/acts1984/1984035.htm#aofs>

<http://www.pro.gov.uk/recordsmanagement/dp/default.htm>

The information to be contained in personal data shall be obtained, and personal data shall be processed, fairly and lawfully.

Personal data shall be held only for one or more specified and lawful purposes.

Personal data held for any purpose or purposes shall not be used or disclosed in any manner incompatible with that purpose or those purposes.

Personal data held for any purpose or purposes shall be adequate, relevant and not excessive in relation to that purpose or those purposes.

Personal data shall be accurate and, where necessary, kept up to date.

Personal data held for any purpose or purposes shall not be kept for longer than is necessary for that purpose or those purposes.

An individual shall be entitled at reasonable intervals and without undue delay or expense to be informed by any data user whether he holds personal data of which that individual is the subject; and access to any such data held by a data user; and where appropriate, to have such data corrected or erased.

Personal data held by data users or in respect of which services are provided by persons carrying on computer bureau. Appropriate security measures shall be taken against unauthorised access to, or alteration, disclosure or destruction of, personal data and against accidental loss or destruction of personal data.

Abbreviations & Terminology

Item	Meaning
ADSL	Asymmetric Digital Subscriber Line
Bit	1 or 0 level of storage is called a bit
BPS	Bits Per Second
Byte	A measurement of storage capacity
CBT	Computer Based Training
CD	Compact Disk
CD-R	Compact Disk - Recordable
CD-ROM	Compact Disk - Read Only Memory
CPU	Central Processing Unit
DAT	Digital Audio Tape
DOS	Disk Operating System
DSL	Digital Subscriber Lines
DVD	Digital Versatile Disk
FTP	File Transfer Protocol
GByte	Gigabyte. A gigabyte consists of 1024 MBytes
GHz	Measurement of computer speed. Gigahertz
GUI	Graphical User Interface
Hz	Hertz (this is a measurement of frequency (i.e. speed).
IS	Information Systems
ISDN	Integrated Services Digital Network
IT	Information Technology
KByte	Kilobyte. A kilobyte (KB) consists of 1024 bytes.
LAN	Local Area Network
MByte	Megabyte. A megabyte (MB) is one million bytes
MHz	Million Hertz
PC	Personal Computer
PSTN	Public Switched Telephone Network
RAM	Random Access Memory
ROM	Read Only Memory
ROM-BIOS	Read Only Memory - Basic Input Output System
RSI	Repetitive Strain Injury
TByte	Terabyte. A terabyte (TB) is one million MBytes
UPS	Uninterruptible Power Supply
USB	Universal Serial Bus
VDU	Visual Display Unit
WAN	Wide Area Network
WWW	World Wide Web