ECDL/ICDL - Module 1
Basic Concepts of Information Technology

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1.1 Getting Started
1.1.1 Hardware/Software Information Technology
1.1.1.1 Understand the Basic Concepts of Hardware, Software and 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 instructions that makes the computer work.
  - Software is held either on your computers hard disk, CD-ROM, DVD or on a diskette (floppy disk) and is loaded (i.e. copied) from the disk into the computers RAM (Random Access Memory), as and when required.
1.1.2 Types of Computer
1.1.2.1 Distinguish Between Main-frame Computer, Minicomputer, Network Computer, PC, and Laptop.

*Slide 1 of 3*

- Make sure you understand the following terms:
  - Mainframe computer
  - Mini-computer
  - Super-computer
  - Networked computer
  - Laptop computer

- What is the difference between a PC and a Mac?
1.1.2.1 Distinguish Between Computers in Terms of Capacity, Speed, Cost, and Typical Users.

**Slide 2 of 3**

- **Mini and Mainframe Computers**
  - Very powerful, used by large organisations such as banks to control the entire business operation. Very expensive!

- **Personal Computers**
  - Cheap and easy to use. Often used as stand-alone computers or in a network. May be connected to large mainframe computers within big companies.
1.1.2.1 Understand the Terms Intelligent and Dumb Terminal.

*Slide 3 of 3*

- An intelligent terminal, for example a PC:
  - Performs a lot of the processing locally
  - You could use a PC, linked to a mainframe

- A dumb terminal:
  - Has very limited processing capabilities itself, but allows you to connect to a large powerful computer such as a mainframe.
  - When you process your data from the dumb terminal, it is the mainframe at the other end of the network that is performing all the calculations.
1.1.3 Main Parts of a Personal Computer
1.1.3.1 Know the Main Parts of a Personal Computer: The Central Processing Unit (CPU)

Slide 1 of 6

- 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 speed.
  - Thus a 600 MHz Pentium is much faster than say a 400 MHz Pentium CPU.
  - It is the CPU that performs all the calculations within the computer.
1.1.3.1 Know the Main Parts of a Personal Computer: The Hard 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.
1.1.3.1 Know the Main Parts of a Personal Computer: Common Input/output Devices

**Slide 3 of 6**

- **Input devices**
  - Keyboard
  - Mouse
  - Scanner
  - Digital cameras

- **Output Devices**
  - Monitor (VDU Visual Display Unit)
  - Speakers
1.1.3.1 Know the Main Parts of a Personal Computer: Types of Memory

**Slide 4 of 6**

- **RAM**
  - The RAM (Random Access Memory) is where the operating system is loaded and also where your applications are copied to when you load an application, such as a word processor or database program.

- **ROM**
  - 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 that is required to make your computer work with your operating system.
1.1.3.1 Know the Main Parts of a Personal Computer: 
Diskettes, Zip Disk & CD-ROM

**Slide 5 of 6**

- **Diskettes**
  - They are very slow compared to hard disks or CD-ROMs, and hold relatively small amounts of data (1.44 Mbytes). Unreliable

- **Zip and Jaz Drives**
  - Similar concept to diskettes, but hold a lot more data!

- **CD-ROM & DVDs**
  - Similar to the audio devices familiar in home use but hold computer data rather than music
1.1.3.1 Know the Main Parts of a Personal Computer: Understand the Term ‘Peripheral Device’

--- Slide 6 of 6 ---

- A peripheral device is any device that you can attach to your computer.
  - Thus you could attach a scanner or modem to the back of your system unit.
1.2 Hardware
1.2.1 Central Processing Unit
1.2.1.1 Understand the Term Central Processing Unit (CPU) and Know What the CPU Does

- **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.
1.2.2 Input Devices
1.2.2.1 Devices for Inputting Data

**Slide 1 of 2**

- **The Mouse**
  - Used to ‘drive’ Microsoft Windows
- **The Keyboard**
  - The keyboard is still the commonest way of entering information into a computer
- **Tracker Balls**
  - an alternative to the traditional mouse and often used by graphic designers
1.2.2.1 Devices for Inputting Data

**Slide 2 of 2**

- **Scanners**
  - A scanner allows you to scan printed material and convert it into a file format that may be used within the PC

- **Touch Pads**
  - A device that lays on the desktop and responds to pressure

- **Light Pens**
  - Used to allow users to point to areas on a screen

- **Joysticks**
  - Many games require a joystick for the proper playing of the game
1.2.3 Output Devices
1.2.3.1 Common Output Devices

**Slide 1 of 2**

- **VDU**
  - The computer screen is used for outputting information in an understandable format for humans

- **Printers**
  - There are many different types of printers.
  - In large organizations laser printers are most commonly used due to the fact that they can print very fast and give a very high quality output.
1.2.3.1 Common Output Devices

**Slide 2 of 2**

- **Plotters**
  - A plotter is an output device similar to a printer, but normally allows you to print larger images.

- **Speakers**
  - Enhances the value of educational and presentation products.

- **Speech synthesizers**
  - Gives you the ability to not only to display text on a monitor but also to read the text to you.
1.3 Storage
1.3.1 Memory Storage Devices
1.3.1.1 Compare Memory Storage Devices

**Slide 1 of 7**

- **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.

- **Capacity:**
  - Enormous! Often in excess of 10 Gigabytes. A Gigabyte is equivalent to 1024 Megabytes.

- **Cost:**
  - Hard disks costs are falling rapidly and normally represent the cheapest way of storing data.
1.3.1.1 Compare Memory Storage Devices

Slide 2 of 7

- **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.
1.3.1.1 Compare Memory Storage Devices

**Slide 3 of 7**

- **Zip Disks**
  - **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 that you wish to use in the drive. Often suppliers will sell the drive plus a pack of 5 disks at a bundled discount price.
1.3.1.1 Compare Memory Storage Devices

**Slide 4 of 7**

- **Jaz Disks**

- **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 that you wish to use in the drive. Often suppliers will sell the drive plus a pack of 5 disks at a bundled discount price.
1.3.1.1 Compare Memory Storage Devices

**Slide 5 of 7**

- **Diskettes (Floppy Disks)**
  - **Speed:**
    - Very slow!
  - **Capacity:**
    - Normally 1.44 Mbytes.
  - **Cost:**
    - Very cheap.
1.3.1.1 Compare Memory Storage Devices

Slide 6 of 7

- **CD-ROM Disks**

- **Speed:**
  - Much slower than hard disks. The original CD-ROM speciation is now given a value of 1x speed, and later, faster CD-ROMs are quoted as a multiple of this value.

- **Capacity:**
  - Around 650 Mbytes.

- **Cost:**
  - Below £100 each (UK sterling).
1.3.1.1 Compare Memory Storage Devices

**Slide 7 of 7**

- **DVD Drives**

  - **Speed:**
    - Much faster than CD-ROM drives but not as fast as hard disks.

  - **Capacity:**
    - Up to 17 Gbytes.

  - **Cost:**
    - Slightly higher than CD-ROM drives.
1.3.2 Types of Memory
1.3.2.1 Understand RAM & ROM.

**Slide 1 of 2**

- **RAM - Random Access Memory**
  - 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.
  - As a rough rule, a Microsoft Windows based computer will operate faster if you install more RAM. Data and programs stored in RAM are volatile (i.e. the information is lost when you switch off the computer).
1.3.2.1 Understand RAM & ROM.

**Slide 2 of 2**

- **ROM – Read Only Memory**
  - Read Only Memory (ROM) as the name suggests is a special type of memory chip that holds software that 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.
1.3.3 Measuring Memory
1.3.3.1 Know How Computer Memory Is Measured

Slide 1 of 2

- **Bit**
  - All computers work on a binary numbering system, i.e. they process data in one's or zero's. This 1 or 0 level of storage is called a bit.
- **Byte**
  - A byte consists of eight bits.
- **Kilobyte**
  - A kilobyte (KB) consists of 1024 bytes.
- **Megabyte**
  - A megabyte (MB) consists of 1024 kilobytes.
- **Gigabyte**
  - A gigabyte (GB) consists of 1024 megabytes.
1.3.3.1 Know How Computer Memory Is Measured

Slide 2 of 2

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

- **Records**
  - A record is a collection of data held within a file.
  - It is the sort of storage unit used by a database.
1.3.4 Computer Performance
1.3.4.1 Know Some of the Factors That Impact on a Computer's Performance

- CPU speed
- RAM size
- Hard disk speed and capacity
1.4 Software
1.4.1 Types of Software
1.4.1.1 Know the Meaning of the Terms; Operating Systems Software & Applications Software

• Operating systems software
  – The operating system is a special type of program that 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.

• Applications software
  – An application program is the type of program that you use once the operating system has been loaded.
  – Examples include word-processing programs, spreadsheets and databases.
1.4.2 Operating System Software
1.4.2.1 Understand the Main Functions of an Operating System.

*Slide 1 of 3*

- The link between the hardware and you, the user
- Makes the computer easy to use without having to understand bits and bytes!
1.4.2.1 Understand the Term
Graphical User Interface (GUI)

*Slide 2 of 3*

- A Graphical User Interface (GUI) is simply an additional part of the operating system that displays windows and drop down menus, and also enables you to drive your computer using a mouse.
- Examples of operating system that use a GUI include Windows 3.1, Windows 95/98/2000, Windows NT and IBM's OS/2.
1.4.2.1 The Main Advantages of Using a GUI Interface.

*Slide 3 of 3*

- All programs look similar.
- When you switch from a program supplied by one manufacturer to one from a different manufacturer, you will find the transition very easy.
- Application programs work in the same way as the underlying operating system.
- The GUI also allows programmers to easily write consistent looking programs.
1.4.3 Applications Software
1.4.3.1 List Some Common Software Applications Together With Their Uses.

**Slide 1 of 2**

- **Word processing applications**
  - Microsoft Word
  - Lotus Word Pro
  - WordPerfect

- **Spreadsheets**
  - Microsoft Excel
  - Lotus 123

- **Database**
  - Microsoft Access
  - Lotus Approach
1.4.3.1 List Some Common Software Applications Together With Their Uses.

Slide 2 of 2

- **Payroll**
  - Sage software
- **Presentation tools**
  - Microsoft PowerPoint
  - Lotus Freelance
- **Desktop publishing**
  - Abode Photoshop
- **Multimedia applications**
  - Microsoft's Encarta CD-ROM based encyclopaedias
1.4.4 Systems Development

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1.4.4.1 Understand How Computer-based Systems Are Developed

- Feasibility Study
- Design
- Programming
- Implementation
1.5 Information Networks
1.5.1 LAN and WAN

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1.5.1.1 Know the Definitions of Local Area Networks (LAN) and Wide Area Networks (WAN).

**Slide 1 of 2**

- **LAN**
  - A LAN (Local Area Network) is a system whereby individual PCs are connected together within a company or organization.

- **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).
1.5.1.1 Know the Definitions of Local Area Networks (LAN) and Wide Area Networks (WAN).

**Slide 2 of 2**

- 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.
1.5.2 The Telephone Network in Computing
1.5.2.1 Understand the Use of the Telephone Network in Computing and Understand the Terminology

**Slide 1 of 4**

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

- **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 64K or 128K of data per second.

- **Satellites**
  - Satellite communications makes it possible for you to make a telephone call or access the internet from almost anywhere on the planet.
1.5.2.1 Understand the Use of the Telephone Network in Computing and Understand the Terminology

Slide 2 of 4

• Fax
  – A fax machine allows you to transmit printed material over the telephone system.
  – The sending fax machine scans the page and converts the information into sound.
  – The receiving fax converts the sound back into an image of the page for printing.
  – Most modern computers contain a modem that is capable of sending/receiving faxes without the need for a separate, dedicated fax machine.

• Telex
  – Telex is an old system used for sending typed messages via the Telex network, which has largely been replaced by the fax and email systems.
1.5.2.1 Understand the Use of the Telephone Network in Computing and Understand the Terminology

**Slide 3 of 4**

- **Modem**
  - Short 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 that can be used by the receiving computer.
1.5.2.1 Understand the Use of the Telephone Network in Computing and Understand the Terminology

Slide 4 of 4

- **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.

- **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).
1.5.3 Electronic Mail
1.5.3.1 Understand the Electronic Mail and Know the Uses of E-mail.

*Slide 1 of 2*

- When you send an email its transmission is often almost instantaneous.
  - This is especially useful when sending a message to someone in a different country.

- This can be very useful in a business environment, however this facility can be abused and it is now possible for people to send email via the Internet to millions of people.
  - This rather stupid habit is known as Spamming by the Internet community and is very strongly disapproved of!
1.5.3.1 Understand the Electronic Mail and Know the Uses of E-mail.

*Slide 2 of 2*

- To send and receive email you require a computer, plus the necessary hardware and software.
  - Internal company emails are sent and received via your company’s LAN (Local Area Network).
1.5.4 The Internet
1.5.4.1 Know What the Internet Is.

Slide 1 of 3

- The Internet is a global network of interconnected networks.
- The unique thing about the Internet is the sheer amount of information that you can access from it.
- Whatever your interest you can search for and find information on the most obscure topics.
1.5.4.1 Know What the Internet Is.

Slide 2 of 3

- To search the Internet you use what are called Internet search engines.
- These are easily accessed via your Internet browser (i.e. Microsoft Internet Explorer or Netscape Navigator/Communicator).
- Within the search engine you enter a word or phrase and it will retrieve documents from the Internet based on the information you typed in.
1.5.4.1 Know What the Internet Is.

**Slide 3 of 3**

- If you are sending a traditional letter to many people, then you have to pay a fixed price for each person that you are sending the letter to.
  - The great thing about email is that when you have the correct software you can send to one person or many people for almost the same price and that price will be a fraction of the cost of using traditional posted letters.

- The other great thing about email is that transmission of the email is almost instant.
  - Whether the recipient is in the next room or on the other side of the world.
1.6 Computers in Everyday Life
1.6.1 Computers in the Home
1.6.1.1 Know Some of the Uses of the PC at Home

- Common uses for the computer within the home
  - Computer games
  - Home working
  - Home banking
  - Connecting to the Web
1.6.2 Computers at Work or in Education

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1.6.2.1 Know the Uses of Office Applications

*Slide 1 of 5*

- **CBT (Computer Based Training)**
  - 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 and combine text, graphics and sound.
  - Packages range from general encyclopaedias right through to learning a foreign language.
1.6.2.1 Know the Uses of Office Applications

Slide 2 of 5

• Automated Production Systems
  – Many car factories are almost completely automated and the cars are assembled by computer-controlled robots.
  – This automation is becoming increasingly common throughout industry.
1.6.2.1 Know the Uses of Office Applications

*Slide 3 of 5*

- **Design Systems**
  - Many products are designed using CAD (Computer Aided Design) programs to produce exact specifications and detailed drawings on the computer before producing models of new products.
1.6.2.1 Know the Uses of Office Applications

**Slide 4 of 5**

- **Stock Control**
  - Stock control is ideal for automation and in many companies it is now completely computerized.
  - The stock control system keeps track of the number of items in stock and can automatically order replacement items when required.

- **Accounts / Payroll**
  - In most large organizations the accounts are maintained by a computerized system.
  - Due to the repetitive nature of accounts a computer system is ideally suited to this task and accuracy is guaranteed.
1.6.2.1 Know the Uses of Office Applications

**Slide 5 of 5**

- Repetitive tasks
- Easily automated tasks
- Mathematical calculations
- Dangerous situations
1.6.3 Computers in Daily Life
1.6.3.1 Be Aware of the Uses of Computers in Every-day Life

- Accounts
- Games
- Educational
- On-line banking
- Smart ID cards
- Supermarkets
- Working from home (Tele-working)
- Internet
- Bank 'hole in the wall' cash machines
1.7 IT and Society
1.7.1 A Changing World
1.7.1.1 Understand the Terms Information Society and Information Superhighway.

Slide 1 of 2

- The concept of the Information society refers to the fact that it is now very easy to link computers together and access information stored on other computers.
- The Internet is a good example.
  - By connecting to the Internet you gain access to millions of other computers that are connected around the world.
- You can communicate via email with anyone on this planet (assuming they also have an email connection).
1.7.1.1 Understand the Terms Information Society and Information Superhighway.

**Slide 2 of 2**

- The phrase e-commerce is a buzz word that relates to buying or selling via the Internet.
  - Increasingly you can purchase directly via a Web site by selecting the goods or services that you require and entering your credit card details.
1.7.2 A Good Workspace
1.7.2.1 Understand What Elements and Practices Can Help Create a Good Working Environment

- Frequent breaks away from the computer
- Appropriate positioning of screens, chairs and keyboards
- Provision of adequate lighting and ventilation.
1.7.3 Health and Safety
1.7.3.1 Be Aware of Health and Safety Precautions When Using a Computer

• Make sure that cables are safely secured
• Make sure that power points are not overloaded
• Also be aware of:
  – Repetitive Strain Injury (RSI)
  – Glare from screens
  – Bad posture
1.8 Security, Copyright and the Law
1.8.1 Security
1.8.1.1 Know About the Purpose and Value of Backing Store of Computer Files

*Slide 1 of 4*

- The most important thing that 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 that is stored on the computer.
1.8.1.1 Know About the Purpose and Value of Backing Store of Computer Files

*Slide 2 of 4*

- Organize your computer for more efficient backups
- Complete vs. incremental backups
- Use 'off-site' storage
- Beware of 'open files'
1.8.1.1 Know About the Purpose and Value of Backing Store of Computer Files

*Slide 3 of 4*

- Use passwords
- Understand the Importance of shutting down your computer properly
- Use a UPS (Un-interruptible Power Supply)
- Use electrical surge protection
1.8.1.1 Know About the Purpose and Value of Backing Store of Computer Files

*Slide 4 of 4*

- **Things computer like:**
  - Good ventilation
  - Clean environment
  - Stable, vibration free surface

- **Things computer don’t like:**
  - Dust
  - Drinking and eating over the keyboard
  - Heat, Cold or Moisture
  - Don’t place objects on top of monitors.
  - Don’t place floppy disks near monitors.
1.8.2 Computer Viruses
1.8.2.1 Understand the Term Computer Virus

Slide 1 of 3

• What are computer viruses?
  – Viruses are small programs that 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.
1.8.2.1 Understand the Term Computer Virus

**Slide 2 of 3**

- 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 they can spread from one computer to another, either via use of infected floppy disk, or over a computer network, including the Internet.
1.8.2.1 Understand the Term Computer Virus

*Slide 3 of 3*

- **How to prevent virus damage**
  - There are a number of third party anti-virus products available.
  - Most of these are better than the rather rudimentary products available within DOS and Windows, but of course you do have to pay for them!
  - 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 through an electronic, on-line bulletin board.
1.8.3 Copyright
1.8.3.1 Understand Software Copyright

• Be aware of software copyright issues
• Freeware
• Shareware
• What about software that you find on the Internet?
• Software site licenses
1.8.4 Data Protection Act
1.8.4.1 Know the Data Protection Act in Your Country.

- If your computer system holds information about individuals then you have a moral and legal duty to treat that information with respect.
- In a free society you have a right to ensure that information held about you is not abused.
- In many countries this right is enshrined under data protection laws