

European Computer Driving Licence

Computer Essentials

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■ COMPUTERS & DEVICES

Information & Communication Technology

Software

You might have the fastest computer sitting on your desk in front of you, however, without software the computer will do nothing more than take up space. The computer hardware on its own has no intelligence and therefore must be supplied with instructions to perform any task.

Software or **programs**, consist of step-by-step instructions that tell the computer how to perform a task.

All software can be divided into two categories – operating system software and application software.

Operating System Software

Operating System (OS) software is a program that controls the computer and enables it to run applications software (discussed further down). Systems software allows the computer to manage its internal resources.

This software is designed to allow the computer system to manage its own resources (disks, monitor, keyboard, and printer). This software runs the basic computer operations - it tells the hardware what to do and how, and when to do it. Applications software cannot run without system software.

Common desktop operating system software includes:

- **MS Windows** – provides an easy interface between the computer and the user. It uses pictures (graphical representations) which look like push buttons on the screen and you can use the mouse to press them. This interface is known as a *Graphical User Interface* (GUI).

MS Windows comes in a variety of versions. It has been updated over the years to make it more powerful and easier to use.



- **Macintosh Operating System (Mac OS)** – is the standard operating for Apple Corporation's Macintosh computers. Like Windows, the MAC OS has a GUI interface.



Besides, MS Windows and MAC OS there are other operating systems for example Linux, Unix and OS/2 Warp.

Mobile devices, such as tablets and smartphones also include operating systems that provide a GUI and can run applications. Common mobile operating systems include Android, iOS (for iPads & iPhones), and Windows Phone. These operating systems are

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developed specifically for portable devices and therefore are designed around touchscreen input.

Applications Software

Applications software are programs that help the user carry out specific tasks on the computer. Such software has been written for a specific application - such as word-processors, spreadsheets, databases and presentation software.

Application software falls into two categories:

- 1. Tailor-made (or custom-written) software** – is software designed for a particular customer. Typically individual computer programmers or software houses are contracted to develop computerised systems for companies and organisations.
- 2. Off-the-Shelf (or packaged) software** – is software designed for use by the general public. Typically off-the-shelf software is available from all software selling shops. Large software houses develop this software.

Off-the-shelf software includes:

- **Word-processing programs** (e.g. MS Word, Writer) – used to prepare text-based documents such as letters, memos, reports etc.
- **Spreadsheet programs** (e.g. MS Excel, Calc) – used to analyse and summarise numerical data. Spreadsheets are commonly used in accounting environments to prepare balance sheets and financial reports.
- **Database programs** (e.g. MS Access, Base) – used to organise and manage large quantities of data. Databases enable efficient manipulation of data.
- **Presentation graphics programs** (e.g. MS PowerPoint, Impress) – used to organise text and numeric data in an appropriate format to be displayed to a group of people. Typically presentations are used in the preparation of on-screen displays, overhead transparencies and 35mm slides.
- **Photoediting programs** (e.g. MS PhotoEditor, Adobe PhotoShop, GIMP) – used to alter images and graphics. These programs are used to change the size of pictures, crop pictures, adjust the colours of pictures etc.
- **Desktop publishing programs** (e.g. MS Publisher, Adobe InDesign) – used to prepare high quality printed material e.g. flyers, invitations, posters, reports, magazines, and books.
- **Internet Web Browsers** (e.g. MS Internet Explorer, Google Chrome, Mozilla Firefox, Opera) – used to locate and display information at Web sites. Browsers display Web pages with text, graphics, sounds and video-clips.
- **Communications software** (e.g. MS Outlook, Mozilla Thunderbird) – used for the transmission of electronic messages or documents between different computers.

- **Social Networking websites** (e.g. Facebook, LinkedIn) – allow users to be part of a virtual community. These websites provide users with simple tools to create a custom profile with text and pictures. A typical profile includes basic information about the user, photo albums, videos and comments published by the user. People use social networking sites to add friends, send messages to other users, and leave comments directly on friends' profiles. Some people join special interest groups on social networking sites.
- **Mobile applications** (or mobile apps) – are software programs designed to run on smartphones, tablets and other mobile devices. These programs are usually available through application distribution platforms (e.g. Apple App Store, Google Play, Windows Phone Store etc.). Some mobile apps are free, while others must be bought. Mobile apps include email, calendar, contacts, weather information, location based services, banking, order-tracking and ticket purchases.

Most of the above software is installed on desktops and computers and can be used without an Internet connection. However, more and more software (e.g. Microsoft Office 365, Google Apps, Adobe) is also available online. For example, you can create and edit a document online using Microsoft Office 365 or Google Docs.

Copyright

Computer users should be aware of the copyright issues with regards to software and files such as graphics, text, audio and video. A copyright is the exclusive legal right that prohibits copying of intellectual property without permission of the copyright holder.

Computer software is considered as intellectual property and is protected by the copyright law.

The Internet and the World Wide Web present tremendous opportunities for sharing information but it is important to remember that what is freely available does not imply that it can be copied. You should assume that images, text, logos, software, sounds, movie clips, email and postings to newsgroups are copyrighted. Under copyright law, you cannot copy work/files unless you have been given permission to do so. In some cases, there may be permission statements included with the work/files that allow you to use the work/files for the stated purposes.

Software piracy - is the unauthorised distribution and use of copyrighted computer programs. Software and data files can be easily copied and transmitted via disks.

Making a copy of commercial/propriety software (discussed further down) for a relative or friend is an act of piracy.

Software and data files can also be downloaded from a network and copied. This is known as network piracy.

Types of Software Licences

- **Propriety software** – is software whose rights are owned by an individual or business, usually a software developer. The ownership is protected by the copyright, and the owner expects you to buy a copy in order to use it. The software cannot legally be used or copied without permission.

Nearly all applications are licensed rather than sold. There are a variety of different types of software licenses. Some are based on the number machines on which the licensed program can run whereas others are based on the number of users that can use the program. Most personal computer software licenses allow you to run the program on only one machine and to make copies of the software only for backup purposes. Some licenses also allow you to run the program on different computers as long as you don't use the copies simultaneously.

- **Open source software** – is freely available to the public. The programmer creates a program and makes it available for others to use without cost. Other programmers are also free to modify the source code and redistribute the modifications to users and developer community. Open source programs are often developed as a community rather than by a single organisation.
- **Trial version software** – refers to software which consumers can try before they buy. Trial versions of software usually contain all the functionality of the regular version, but can only be used for a limited time (e.g. 30-day trial).

- **Shareware software** – is copyrighted software that is distributed free of charge but requires users to make a contribution in order to receive technical help, documentation or upgrades.

Shareware is inexpensive because it is usually produced by a single programmer and is offered directly to customers via the Internet. Thus, there are practically no packaging or advertising expenses.

- **Freeware software** – is software that is available free of charge. Although it is available for free, the author retains the copyright, which means that you cannot do anything with it that is not expressly allowed by the author. Usually, the author allows people to use the software, but not sell it.

End-User Licence Agreement (EULA)

Users have to purchase the appropriate software licences to use propriety software.

Shrink-wrap licences/End User Licence Agreements (EULA) – are printed licenses found inside software packages. Users are duty bound to use the software according to the conditions set out in the license sheet. There is no need for users to sign up any contracts with the software house. Users are encouraged to send the registration card included in the package. This registration entitles users to information and minor upgrades that are released from time to time by the software manufacturer.

■ NETWORKS

The Network

Over the past years, millions of personal computers have been connected together to form computer networks. These networks facilitate the communication of data between different computers and sharing of resources.

A **network** consists of a group of computers and other peripherals (printers, scanners etc.) connected to each other.

The purposes of network include:

- **Sharing of data** – Networking enables several computer users to share data. Thus individual users can work on the same data at the same time. Depending on the configuration of the network, users work on real time updated data.
- **Sharing of peripheral devices** – Networking enables several computer users to share laser printers, scanners, modems etc. Typically, several computer users in the same office are served by a single printer. This is cost effective for organisations with many computer users.
- **Sharing of programs** – Networking enables several computer users to share the same programs. In most organisations, people make use of the same software. Rather than purchasing individual software packages for each computer user, organisations purchase network versions of the program.
- **Efficient communication** – Networking enables efficient exchange messages and documents between several computer users. Networking eliminates the typical delays encountered with standard inter-office mail delivery or telephone calls.

Client / Server Computers

A **client** is a computer that requests data from another computer known as a **server**. Compared to the client computer, the server is a powerful computer in terms of processing speed and data storage.

Different servers may be used to manage different tasks.

- A **file server** is a computer that acts like a disk-drive, storing the programs and data files shared by client computers.
- A **print server** controls one or more printers and stores the print-image output from all computers on the system.
- **Web servers** contain Web pages that can be viewed using a browser.
- **Mail servers** manage e-mail.

Intranet

An **intranet** is an organisation's private network that uses the infrastructure and standards of the Internet and World Wide Web. It is a website accessible only by the organisation's members, employees or other persons with authorisation.

When an organisation develops a public website on the Internet, it is making selected information available to the general public. When it creates an intranet, it is making selected information available only to authorised personnel.

An intranet's Web site looks and acts just like any other Web sites, but the firewall surrounding an intranet prohibits unauthorized access. Intranets enable employees to have quicker access to internal information and to share knowledge so that they can do their jobs better.

Virtual Private Network

A **Virtual Private Network (VPN)** is a private network that uses the Internet to connect remote sites or users together. This technology is particularly useful for employees who need to access office data from their laptops at home and other locations. Data travels securely through the VPN technology.

Businesses often use VPNs to communicate across multiple locations. For example, a large company that has offices in several cities may need to send data to the different locations via the Internet. To keep the information secure, the company sets up a VPN.

Data Transfer Rate

The **data transfer rate** is commonly used to measure how fast data is transferred from one location to another.

Data is transmitted in characters or collections of bits. The transmission speed of data is measured in:

- **bps** – stands for bits per second. 8 bits = 1 character (Letter 'A' = 8 bits).
- **kbps** – stands for kilobits per second or 1000 bits per second. A 56.6K modem technically transmits 56,600 bits per second of data.
- **mbps** – stands for megabits per second or 1,000,000 bits per second.
- **gbps** – stands for gigabits per second. 1Gbps is equal to 1,000,000,000 bits per second.

Downloading / Uploading

Downloading refers to the transfer of data from a server to a local computer. For example when you view a webpage, the source code of a webpage is copied to your browser from a server across the Internet. Another example is when you download a document from Internet to your computer. When downloading files, the larger the file, the more time it takes to complete the transfer.

Uploading refers to the transfer of data from a local computer to a server. For example, you can create a website and then upload this from your computer to your web server.

Internet Connection Services

Computers can be connected in different ways to the Internet.

- **Dialup connection** – is a form of Internet access that uses telephone lines. The computer uses a special device called a modem that dials a telephone number and connects to an Internet Service Provider (ISP). Once connected users can browse the web, access emails etc.

Dial-up connections are inexpensive compared to broadband connections. However data transfer over dial-up is slower compared to broadband connections. Another disadvantage of dial-up connections is that no voice calls can be made/received through the phone line when this is being used for Internet.

Internet Service Providers (ISPs) are companies that sell the services of their Internet server to stand-alone computer users.

- **Broadband connection** – is a connection that enables fast data transfer rates between computers connected to Internet. A broadband connection is a permanent 'always-on' connection to Internet. Being an 'always-on' connection makes computers more prone to intruder (or hacker) attacks. Firewalls are installed to prevent such attacks. Typically a user pays a flat-rate monthly fee when subscribing to a broadband connection.

Broadband connections are available through a phone line (ADSL), a cable, Wi-Fi, WiMax, a mobile phone and satellite.

Asynchronous Digital Subscriber Line (ADSL) broadband – is a broadband connection that uses a modem and the telephone line system to connect a computer to Internet. The ADSL modem is different from a dial-up modem. Through ADSL, a user can use the same phone line to connect to Internet and make a voice call at the same time. ADSL connections are faster compared to dial-up connections. Incoming data (downloading) is significantly faster than outgoing data (uploading). ADSL connections are expensive compared to a dial-up connection.

Cable broadband – is a broadband connection that uses a modem and the cabling infrastructure used for cable TV to connect a computer to Internet. The cable modem uses the same cabling infrastructure and connection to your home as cable TV. The cable modem connects to the computer via a local area network (LAN) card. Cable connections are faster compared to dial-up connections. Incoming data (downloading) is significantly faster than outgoing data (uploading). The cost of a cable connection is similar to an ADSL connection.

Wi-Fi - is a connection that uses radio transmitters and receivers to link computers. Many organisations and public areas provide wireless local area network hotspots known as Wi-Fi (Wireless Fidelity) hotspots. Users can

subscribe to these connections. In some public areas such connections are provided at no charge. Nowadays many users have wireless Internet connectivity at home. Many smart phones support wireless connectivity.

WiMAX is a wireless communications standard similar to Wi-Fi, but supports a far greater range of coverage. While a Wi-Fi signal can cover a radius of 30m, a fixed WiMAX station can cover a range of up to 50km. Mobile WiMAX stations can broadcast up to 16km.

Mobile phone – Telecommunication companies offer subscriptions that include Internet on smartphones. There are different mobile Internet technologies.

Satellite broadband – is an Internet connection that requires the installation of a special satellite dish.

Internet Service Provider

The **Internet Service Provider** (ISP) is a company that provides users with Internet connection services. ISPs provide home users with an Internet Account consisting of a username and a password. Users having the appropriate hardware and software will use the Internet Account to access the services available on the Internet.

When choosing an ISP one should consider the following:

- **Connection Speed** - The faster the speed of the broadband service the more expensive it will be. High speed connections will be needed when using the Internet to view HD-quality movies and to play multiplayer games. For light Internet surfing and emailing, one would not require high speed connections.



ISPs quote different download/upload speeds e.g. 4Mbps/512Kbps, 5Mbps/512Kbps etc. to meet different user needs. The download speed (e.g. 4Mbps, 5Mbps etc) is how quickly you can receive information such as reading email, browsing web pages, downloading content such as music and photos and buffer rate when streaming video. The upload speed (e.g. 512Kbps) is how quickly you can send an email or upload photos or video to a website like Facebook, Flickr or YouTube.

- **Quota** - ISPs may set a 'download limit' or quota to limit the volume of data in Gigabytes (GB) downloaded by users during a fixed period, usually a month. You will use your download quota to view web pages and receive emails etc. Downloading large graphic and audio files or video streams (e.g. YouTube videos) will use more of your download quota compared to viewing web pages or receiving emails. If you exceed your download limit, you might incur extra charges, or your ISP could limit or suspend your Internet service.
- **Cost** - ISPs may charge a monthly subscription fee or a pay-per-use fee for use of the Internet Account. When choosing an ISP check also the costs of any equipment you might need to buy such as a modem/router or dongle (for mobile Internet).

Protected & Open Wireless Network

If you have a laptop, you can see a list of available wireless networks, and then connect to one of those networks, no matter where you are.

To view the available wireless networks:

- Open **Connect to a Network** by clicking the network icon  or  in the notification area. A pop up menu will display the list of available wireless networks.





Connect to a Network, showing the shield icon on an unsecured network

Wireless networks can be protected/secure or open. Wireless networks that do not have security enabled (i.e. open networks) will be identified with a yellow shield icon.

Note that:

- Wireless networks appear only if your laptop has a wireless network adapter and driver installed and the adapter is enabled.
- Whenever possible, you should connect to security-enabled wireless networks. If you do connect to an open network, be aware that someone with the right tools can see everything that you do, including the websites you visit, the documents you work on, and the user names and passwords that you use. Changing your network location to Public can help minimize the risk.

To connect to a wireless network:

1. Open **Connect to a Network** by clicking the network icon  or  in the notification area.
2. In the list of available wireless networks, click a network, and then click **Connect**.

Note that:

- The first time you connect to a protected wireless network, you will need to enter a network security key or passphrase.

■ SECURITY & WELL-BEING

Protecting Data

Data security – is concerned with protecting software and data from unauthorised tampering or damage. IT departments often attach more importance to data protection rather than hardware protection. Recovery of lost data is often more expensive than replacing damaged hardware.

Sensitive data should be safeguarded against unauthorised access. In a network environment, the system administrator provides a unique user ID and a password to each computer user. The user ID and password are needed to logon to the networked computer.

Home users are able to set up a start-up password through their operating system. You should also set a password to unlock your screen saver. You can also set password protection to data files.

The use of a strong password enhances the security of your computer system. Your password should be at least 6 characters long. It should consist of both upper- and lower-case letters and also one or more numbers. Your date of birth, phone number or any word that can be found in a dictionary do not constitute a strong password. Passwords should be changed regularly.

Never share or disclose your password to any other person including colleagues, family members etc. Do change your password if you suspect that somebody knows it.

Firewall

A **firewall** is a system designed to prevent unauthorised access to your computer system when connected to Internet. A firewall is simply a program or hardware device that filters information coming through the Internet connection into your private network or computer system. If an incoming packet of information is flagged by the filters, it is not allowed through. Many users having always-on connections (such as ADSL or cable) are encouraged to install personal firewalls (software) that protects their system from intruders.

Backing up Data

Backing up data is the copying of data files to a secondary storage medium (USB flash disk, CD/DVD or magnetic tape streamer) as a precaution in case the first medium fails.

Most users store large quantities of data on the hard disk without backing this on other storage media. It is of utmost importance to backup your data regularly. It is suggested that you make two backups of all your data files.

To be especially safe, you should keep one backup in a different location from the other – off-site storage. The latter protects data against theft and fire hazards.

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You can back up files using operating system commands, or you can buy a special-purpose backup utility (program). Backup programs often compress the data so that backups require fewer disks.

Updating Software

We strongly recommend that you turn on Windows automatic updating so that Windows can install security and other important or recommended updates for your computer as they become available.

Computer programs such as operating systems, email clients, browsers, media players and desktop applications (e.g. wordprocessors, spreadsheets, databases etc.) may have vulnerable defects through which intruders can gain access to your computer.

Software vendors usually release patches or hotfixes for their products when a security vulnerability is discovered. You must ensure that all programs on your computer are updated with the latest available patches. You should also check for any available updates when installing new software.

Software patches can often be downloaded for free from the vendor's website. Some programs (e.g. MS Windows) have utilities which automatically connect to the vendor's website and download any available patches. If there is no automatic update feature for any of your programs, visit the vendors' website regularly and download any available updates.

Energy Saving Practices

As with all other forms of technology, information technology may impact negatively on the environment. All computer users should be aware of the following environmental friendly guidelines related to the use of computing facilities:

- **Switch off equipment** – Switch off the system unit, monitor, speakers, printer and scanner when these are not in use.
- **Automatic shutdown** – You can schedule a specific time when your computer automatically shuts down.
- **Sleep mode settings** - Sleep is a power-saving state that allows a computer to quickly resume full-power operation (typically within several seconds) when you want to start working again.

You can put your computer into sleep mode instead of shutting it down. When your computer is asleep, the display turns off and often the computer's fan stops. Usually, a light on the outside of your computer case blinks or turns yellow to indicate that the computer is asleep. The whole process takes only a few seconds.

Because Windows will remember what you were doing, there's no need to close your programs and files before putting your computer into sleep mode. But it's always a good idea to save your work before putting the computer into any low-power mode. The next time you turn on your computer (and enter your password, if required), the screen will look exactly as it did when you turned off your computer.

To wake your computer, press the power button on your computer case. Because you don't have to wait for Windows to start, your computer wakes within seconds and you can resume work almost immediately.

- **Energy saving monitors** – LCD-type flat screen monitors with LED backlighting to save on power consumption. Adjust the power management options such that monitors are switched off when you are away from your computer.
- **Minimise on paper printing & recycle paper** – A lot of paper is used for printing purposes. Unfortunately the ease with which printers are able to print documents results in waste of a lot of paper. You should proof read documents before sending these to a printer. Also wherever appropriate, you should print two or four pages on a single face of an A4 paper. Most laser printers are also capable of printing on both sides of the paper. You should also print drafts and internal documents on paper that is already printed on one side. Consider use/storage of electronic copies instead of printed paper. Unwanted paper should be recycled.
- **Recycle printer cartridges** – Users should purchase laser printers with longer-life printing drums or toners. Establish contacts with companies which buy used printer cartridges or toners. Use ink and toner saving settings for printing drafts and internal documents.
- **Recycle computers, devices & batteries** - Establish contacts with companies which collect used computers, printers, batteries etc. for recycling purposes.

Enhancing Accessibility

Persons with special needs make use of specific hardware and software to help them work on a computer. Such hardware and software is often referred to as assistive technology.

- **Voice recognition software** is a program used to convert spoken words to text. The term "voice recognition" is sometimes used to refer to speech recognition where the recognition system is trained to a particular speaker. These programs are often used by persons with visibility impairment.
- **Screen reader** is a program that reads the contents of a computer screen aloud to a user. Screen readers are used primarily by visually impaired persons.
- **Screen magnifier** is a program that magnifies a portion of the computer screen, so that it can be more easily viewed. Screen magnifiers are used primarily by individuals with partial visual impairment.
- **On-screen keyboard** is a program that displays a virtual keyboard on the computer screen that allows people with mobility impairments to type data by using a pointing device or joystick. Besides providing a minimum level of functionality for some people with mobility impairments, on-screen keyboard can also help people who do not know how to type.