

STRAND 1

INTRODUCTION TO COMPUTING

COMPONENTS OF COMPUTERS AND COMPUTER SYSTEMS

A computer is an *electronic device* that *accepts data* as input and *processes* it into meaningful *information* called output. This information may be stored or used instantly. The components of a computer system are:

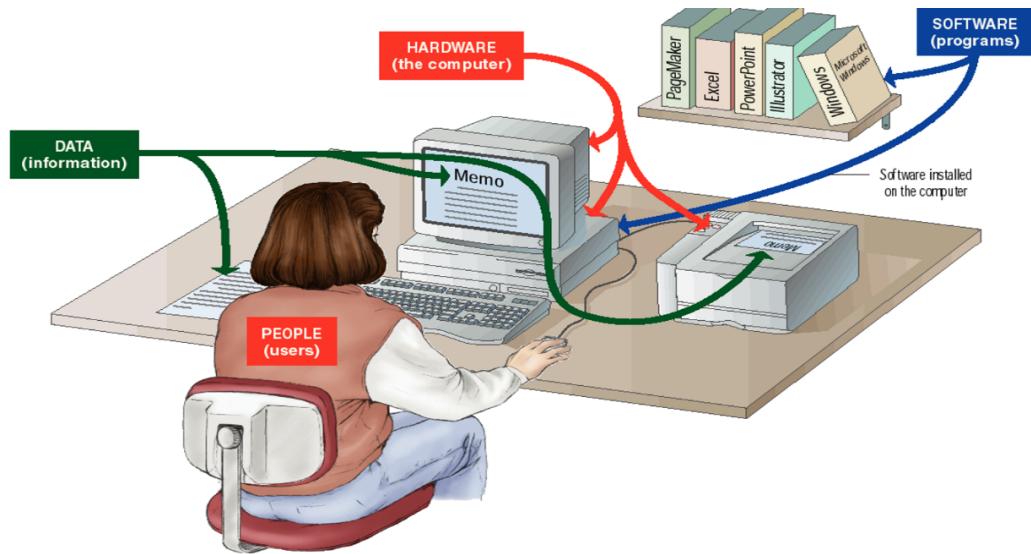
- ▶ Hardware
- ▶ Software
- ▶ Liveware (user)

Hardware refers to the physical components of the computer. It is the parts of the computer that you can see and touch. Examples are mouse, keyboard, system unit and monitor. There are additional hardware devices called peripherals. *Peripherals are devices like printer or scanner that extend their services to enhance the function of the computer.*

The main hardware components of the computer are system unit, monitor, keyboard and mouse.

Software is a *set of instructions* that tells the computer how to perform a task. Unlike hardware, software is not physical. Software provides instructions for the hardware to do work. It is sometimes referred to as program.

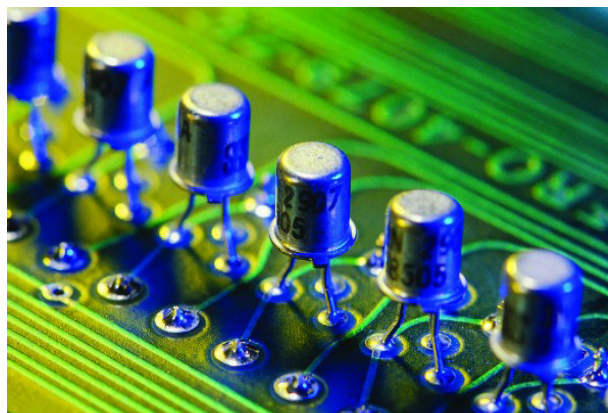
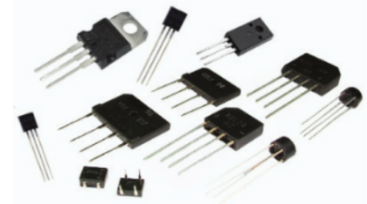
Liveware refers to the user of a computer system. The user feeds the computer system with data for processing.



SECOND AND THIRD GENERATION COMPUTERS

Second generation computers are the computers which use *transistors* as their major processing device. They are also called *transistor computers*. They are more reliable and compact than the first generation computers. Second generation computers came during the 1950s and 1960s.

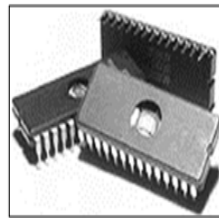
Examples are the IBM 1620, IBM 7000, IBM 650, Harwell CADET etc. The Harwell CADET was the first fully transistorized computer in Europe, and may have been the first fully transistorized computer in the world



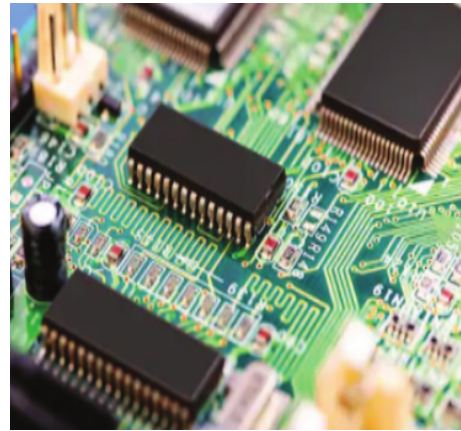
The Harwell CADET

Second generation motherboard

Third generation computers use *integrated circuits (IC's)*. The introduction of the IC made them smaller, faster, reliable and efficient than the second generation computers. A single IC has many transistors, resistors, and capacitors along with the associated circuitry. The IC was invented by Jack Kilby. Third generation computers came around 1964 and 1971. These were the first computers where users interacted using keyboards and monitors which interfaced with an operating system. They were also cheaper than second generation computers. Examples of the third generation computers include *IBM-360 series* and *Honeywell-6000 series*.



IC chips



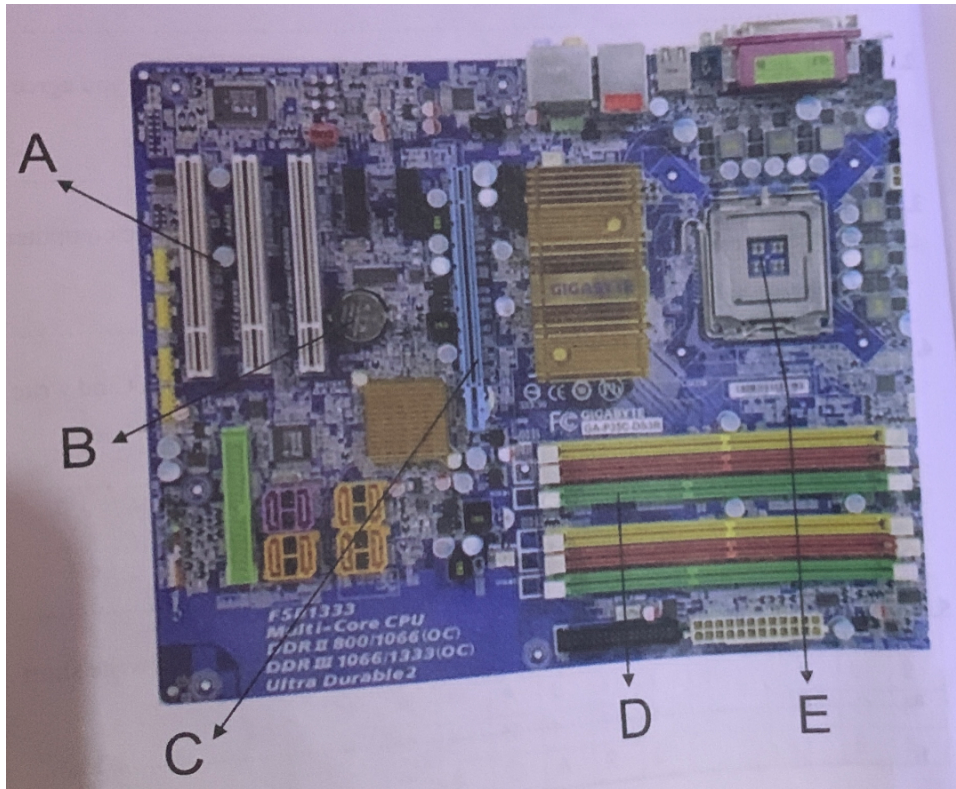
Third generation motherboard

| Second generation computers | Third generation computers |
|--|---|
| Used transistors | Used integrated circuits |
| Smaller and faster than first generation computers | Smaller and faster than second generation computers |
| Generates lots of heat | More energy efficient |
| Relatively expensive | Cheaper than second generation computers |

COMPONENTS OF THE MOTHERBOARD

The motherboard is the main circuit board in the system unit that all other internal

components connect to. The central processing unit (CPU) and memory are usually on the motherboard. Other systems can be connected directly to the motherboard or through a secondary connection. For example, a sound card can be built into the motherboard or connected through the Peripheral Component Interconnect (PCI) Bus.



Identify the components of the motherboard labelled A to E. Compare your answers to the ones provided below:

- A. *PCI slots*
- B. *System battery*
- C. *AGP slot*
- D. *Memory slot*
- E. *Microprocessor*

PCI - Peripheral Component Interconnect

INPUT AND OUTPUT DEVICES

Input devices are devices used to enter data into the computer. Examples are:

Keyboard: It is an input device that is used to key in alphanumeric symbols and issue commands into the computer. There are various types of keyboards. They include standard wired keyboards, wireless keyboards, among others. Keyboard layouts also include QWERTY and DaVinci Concept, each of which suits different environments.



Mouse: It is an input device that is used to direct the cursor on the monitor and control icons on the monitor. The mouse comes in different varieties such as mechanical, optical, opto-mechanical and wireless.



Barcode reader: It is an input device capable of reading a barcode and printing out the details of a product or log information about that product into a database.



Input devices are either *manual* or *automatic*. Manual input devices require humans to do most of the work needed to get data into the computer. Examples of manual input devices are shown below:



Automatic input devices do not require much human interaction to get data into the computer system. For example, all a human has to do to use a barcode reader is point the reader at the barcode and pull the trigger. The reader will do the rest. It is done automatically. Examples of automatic input devices are shown below:



ACTIVITY



- i. Identify the above input devices labelled A to J
- ii. State one function of each of the input devices labelled A to J

Output devices are devices that display processed data or information. Examples are monitor, plotter, projector, speaker, synthesizers etc. The information can be displayed

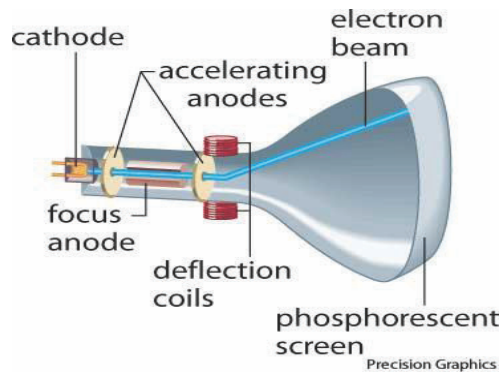
in either *hard copy* format such as a printed information on a paper/ card or *soft copy* format such as information on a screen. Examples of output devices are computer monitor, TV, speaker, plotter, projector, headphone, printer etc.



CATHODE RAY TUBE AND FLAT PANEL MONITORS

The monitor is also known *as Visual Display Unit*. It converts computer output into displayed images. The monitor is an output device. The portion of the monitor that displays the information is called *screen*. It displays information in the form of text or graphics. The monitor works like a television. The two main types are the cathode ray tube and flat panel monitors

A **cathode-ray tube** is a device that uses a beam of electrons in order to produce an image on a screen. Cathode-ray tubes, also known commonly as CRTs, are widely used in a number of electrical devices such as computer screens and television sets.



CRT monitors are gradually been replaced by the flat panels because:

- They are heavy and bulky
- They are power hungry
- Their x-ray radiation has proven to be harmful to humans
- They flicker a lot causing eye strain

Flat panels use display technologies such as Light Emitting Diode (LED) or Liquid Crystal Display (LCD). The LCD and LED technologies have become the standard in screen technology today and are widely used in TVs, monitors and smartphones. Light-Emitting Diode (LED) monitor is a flat screen, flat-panel computer monitor or television. It is relatively lighter in weight.



STORAGE DEVICES

Devices used for storing information are called storage devices. They include flash drive, hard disk drive (HDD), floppy disk, CD/DVD, solid state drive (SSD) etc. Storage devices could be *magnetic, optical or solid-state storage*.

MAGNETIC STORAGE DEVICES

Magnetic storage devices are commonly used for large volumes of data (e.g., video or image) e.g. hard disk drives, magnetic tape, floppy disk, zip drive, cartridges etc. *While optical storage uses light technology, magnetic storage uses magnetic technology for reading and writing data.*

MAGNETIC TAPE

Magnetic tape is a medium with a thin magnetizable coating on a long, narrow strip for reading and writing data. Magnetic tape storage devices include Video Home System (VHS), audio cassette etc.



VHS



Audio cassette

FLOPPY DISK



A diskette or floppy disk is a removable flat piece of flexible plastic film that store data as magnetized spots. They are usually 1.44Mb and 3.5inch. Their capacities are smaller and are used to store smaller amount of data.

HARD DISK



Hard drives have a hard platter that holds the magnetic medium. It uses its tiny read/write heads to read and write information from its spinning platters coated with magnetic material. Most computers use one or more hard disk drives. They have large capacities ranging from Gigabytes to Terabytes. Hard drives can

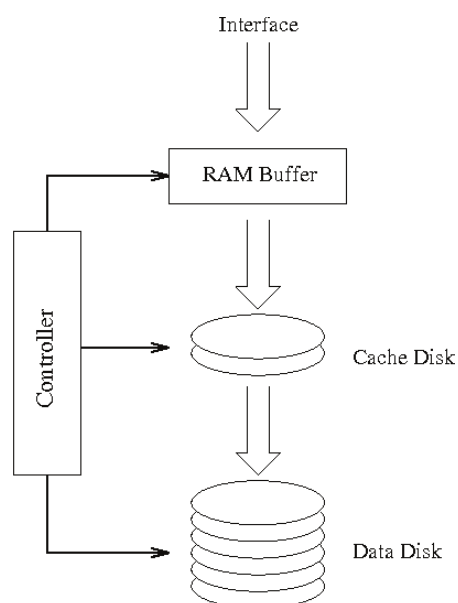
be housed in separate units that can store information independent of the system unit. They are called *external hard drives*. They work by using the USB technology.

FEATURES OF THE HARD DISK DRIVES (HDD)

- ▶ They have read/write heads for reading and writing data
- ▶ They have spinning platters coated with magnetic medium
- ▶ They have large capacities ranging from Gigabytes to Terabytes
- ▶ They are non-volatile (*Thus they do not lose their data when powered off*).
- ▶ They have faster access speeds than floppy disks
- ▶ The HDD is the primary (main) storage device of the computer.

DISK CACHE

Disk cache is a cache memory that is used to speed up the process of storing and accessing data from the host hard disk. It enables faster processing of reading/writing, commands and other input and output processes between the hard disk, the memory and computing components.



FEATURES OF THE WINDOWS DESKTOP

PROCESSING STAGE

At this stage of the cycle, the data is organized and manipulated into meaningful facts or information. The device used to change data into information is the system unit. The System unit contains the Central Processing Unit (CPU), which is the brain of the computer.

OUTPUT STAGE

At this stage, the processed data is displayed or produced in a form that can be used by the user. Information can be displayed as text on the monitor or on a paper. It can also be displayed in the form of sound, video, graphics or graphs. Devices used at this stage are output devices such as *printer, monitor, speaker* etc.

STORAGE

At this stage, the information is saved or stored for future use.

DISTRIBUTION OR COMMUNICATION

At this stage, the data is shared between two or more people.

Note: Communication refers to sending and/ or receiving of information between two or more people through a medium such as telephone or the internet.

INPUT AND OUTPUT DEVICES

TRIAL QUESTIONS

1. Explain communication as used in the computer industry.
2. What is the information processing cycle?
3. What are the three primary stages of the information processing cycle?
4. Differentiate between data and information.

5. Describe the stages data goes through to become information.
6. Explain the meaning of Information and Communication Technology.
7. The computer makes work easier and so does the wheelbarrow. Yet the wheelbarrow is not considered a computer. Explain
8. Differentiate between computer literacy and computer science.
9. State four reasons why ICT should be used in education.
10. Differentiate between computer science and computer literacy
11. Mention four areas of learning where ICT can be integrated

2

PARTS OF A PERSONAL COMPUTER

MAIN COMPONENTS OF A PERSONAL COMPUTER

The main components of a personal computer are:

- *Hardware*
- *Software*

SYSTEM UNIT

The system unit is usually a rectangular box that sits flat on the computer table (desktop system unit) or stands either on or under the table (tower case). Some important components in the system unit include *motherboard*, *Central Processing Unit* (CPU), *hard disk*, *power supply* etc. The motherboard is the main circuitry board in the system unit. Hard disk (HDD) is the main storage medium in the system unit. The CPU is the brain of the computer that works on your data to give information. Other hardware

devices called peripherals are connected to the system unit through ports and connectors.

IMPORTANT COMPONENTS OF THE CENTRAL PROCESSING UNIT

- ▶ *Arithmetic and Logic Unit (ALU)*: It performs all logical operations or calculations
- ▶ *control unit*: It controls all the hardware components
- ▶ *memory unit*: It holds information temporarily on the screen
- ▶ *Registers*: Used to store inputs, outputs or results of computations.

MONITOR

The monitor is also known as *Visual Display Unit*. It converts computer output into displayed images. The monitor is an output device. The portion of the monitor that displays the information is called *screen*. It displays information in the form of text or graphics. The monitor works like a television. The two types of monitors are:

- ▶ Flat panel or Liquid Crystal Display (LCD) monitor
- ▶ Cathode Ray Tube (CRT) monitor

The LCD monitor is slim and flat and consumes less electricity. The CRT is bulky and occupies a lot of space. CRT monitors are gradually being replaced by the more modernized flat panels.

KEYBOARD

It is used to enter data into the computer by typing characters. The common keyboard layout format is the QWERTY keyboard due to the arrangement of the first six alphabet keys. The keyboard is an input device. It contains keys like function keys (F1 to F12), numeric keys (0-9) etc.

MOUSE

The mouse is a pointing device used to select and point to objects on the computer screen. It is also an input device. Some mice connect to the computer via a cable. Others are wireless and therefore do not have cables. There is the left mouse button, right mouse button and a scroll wheel for scrolling up or down information that appears on the screen. The mouse is placed on a surface called mouse pad. *The mouse pad is a rectangular rubber pad covered with fabric that provides more traction than a wooden, glass or table top.* In some programs, when you point at some objects it provides the user with information known as screen tip. *Screen tip gives the user a brief information or description about an object.*

TYPES OF MAIN SOFTWARE

Computer software can be grouped into two types. These are:

- ▶ System software
- ▶ Application software

The process of putting or loading software onto the computer is known as *installation*. After software has been installed, anytime you use it, it is referred to as *running* the software.

SYSTEM SOFTWARE

System software is the software or program or *set of instructions* that is used to control the operation of the computer. It controls the operation of the computer's hardware resources. It allows the installation and running of application software on the computer. Examples of system software include *Operating Systems* (e.g. Microsoft Windows), Device drivers, utility programs (e.g. Anti-virus).

Device drivers refer to system software that controls and communicates with hardware devices attached to the computer.

Utility software is a system software that helps to configure, analyze, optimize or maintain the computer. An example of a utility software is anti-virus program.

Of the examples of system software, the Operating System(OS) is the most important. *To boot a computer system, the user needs an Operating System.* The Operating System is responsible for all the basic operations of the computer and coordinates all the hardware components of the computer. In simple terms, the Operating System is a set of instructions used to control and coordinate the operation of the computer.

EXAMPLES OF OPERATING SYSTEM

- ▶ Windows e.g. Windows XP, ME, Windows 95, Windows 98, Windows 2000, Windows Vista, Windows 7, Windows 8, Windows 10, Windows Server 2008, Windows Server 2012 etc.
- ▶ MSDOS (Microsoft Disk Operating System)
- ▶ Mac OS
- ▶ Solaris
- ▶ Unix
- ▶ Linux
- ▶ Novell NetWare

USES OF SYSTEM SOFTWARE / OPERATING SYSTEM

- ▶ It coordinates all the hardware components.
- ▶ It controls all the operations of the computer.
- ▶ It enables the user to run application software.
- ▶ It allows the user to boot a computer system.
- ▶ It provides an interface, such as Graphical User Interface(GUI), that enables the user to interact with the computer.

APPLICATION SOFTWARE

It is a *program* or *set of instructions* that allows the *user* to *perform a specific task*. It is sometimes referred to as *end-user software*. Application software can be grouped into

- ▶ Custom-made software: This is an application software designed for a particular user to satisfy a specific need. This type is not bought but made to suit a particular user. Software made to calculate payroll of companies or keep track of goods are custom-made software
- ▶ Packaged software: This type of software is designed for the general public and produced in large quantities. Examples include Microsoft Word, CorelDraw, Photoshop etc.

EXAMPLES OF APPLICATION SOFTWARE

- ▶ *Word processors*: Microsoft Word, WordPerfect, Notepad, WordPad, Kingsoft_Writer, AEdit, Apache OpenOffice Writer, IBM Lotus Word Pro, Jarte, Nisus_Writer, KWord, Atlantis Word processor, LibreOffice Writer, GNU TeXmacs, WordGraph etc.
- ▶ *Spreadsheet programs*: Microsoft Excel, Lotus 1-2-3, Quattro Pro
- ▶ *Presentation software*: Microsoft PowerPoint
- ▶ *Database programs*: Microsoft Access
- ▶ *Graphic software*: CorelDraw, Adobe Photoshop, InDesign
- ▶ *Educational software* (a software that enhances teaching and learning): Microsoft_Encarta, Encyclopedia Britannica.
- ▶ *Typing software*: Typing Master, Mavis Beacon Teaches Typing
- ▶ *Entertainment software*: media players like Cyberlink PowerDVD, VLC player, Windows Media Player, Jet Audio and games like Pro Evolution Soccer (PES),
EA Sports FIFA 2019, Need for Speed, Age of Empires, Solitaire etc.

USES OF APPLICATION SOFTWARE

- For word processing e.g. Microsoft Word
- Used to prepare presentation e.g. Microsoft PowerPoint
- Used for working on graphics e.g. CorelDraw
- For communication e.g. Hotmail MSN messenger, Yahoo messenger
- For education (teaching and learning) e.g. Microsoft Encarta
- Used for entertainment e.g. games such as FIFA 2019.

SOME TERMS USED WHEN RUNNING APPLICATIONS

- *Liveware* (user): This refers to the person or user who operates the computer.
- *Installation* is the process of putting or loading software onto the computer.
- *Multitasking* is the ability to run more than one application at a time.

TRIAL QUESTIONS

1. Mention the two main components of the computer.
2. Explain the following briefly:
 - I. System software
 - II. Application software
3. Mention three important components in the system unit
4. List:
 - a. two important components of the central processing unit
 - b. two operating system software
 - c. two application software

- d. two main hardware components of the computer
5. State the function of the following components
 - I. Monitor
 - II. System unit
 - III. Keyboard
 - IV. Mouse
 6. Mention three examples of system software
 7. Write short notes on the following types of monitors
 - i. LCD
 - ii. CRT
 8. What is a screen tip?
 9. What is a mouse pad?
 10. Explain the following terms as used in a computer software environment
 - i. Installation
 - ii. Multitasking
 - iii. Liveware
 11. What is an educational software?

ANSWERS TO TRIAL QUESTIONS

1. Hardware and software
2. (i) System software is a *set of instructions* that controls the operation of the computer.

(ii) Application software is *a set of instructions* used to perform a *specific task*

by the user.

3. Motherboard, CPU, power supply, Hard disk
4.
 - a. Arithmetic and Logic Unit, Memory Unit, Control Unit, Registers
 - b. Microsoft Windows, Unix, Mac OS, Solaris, Ubuntu
 - c. CorelDraw, Microsoft Word, Adobe Photoshop
 - d. monitor, system unit
5.
 - i. Monitor displays the results of a computer work on the screen for human use.
 - ii. The System unit contains the CPU and other components for processing data into information.
 - iii. The keyboard is used for typing data into the computer.
 - iv Mouse is used for selecting, pointing, dragging and opening programs.
6. Device drivers, Microsoft Windows, Mac OS, Linux, Utility programs like anti-virus
7.
 - i. LCD (Liquid Crystal Display) monitors are also called flat panels. They are slim and flat and consume less electricity as well as provide better viewing experience.
 - ii CRT (Cathode Ray Tube) monitors are bulky and chunkier and consume more electricity than flat panels.
8. Screen tip gives the user a brief information or description about an object.
9. The mouse pad is a rectangular rubber pad covered with fabric that provides more traction than a wooden, glass or table top
10.
 - i Installation is the process of loading software onto the computer
 - ii Multitasking is the ability to run more than one application at a time
 - iii Liveware refers to the person or user who operates the computer.

11. Educational software is an interactive software used for teaching and learning.

3

KEYBOARDING AND MOUSE SKILLS

IMPROVING TYPING SPEED

It is a good practice to set goals to measure your progress in typing. The progress is measured in words per minute (wpm). Words per minute (wpm) refers to the amount of words typed in sixty seconds (one minute). Software like Typing Tutor and Mavis Beacon use games and drills to help the user to practice typing. It is very important to rest your fingers on the home row keys first when you start typing.

HOME ROW KEYS

The home key rows are A, S, D, F, J, K, L and ;

They are called home keys because you rest your fingers on them first before you start typing.

MOUSE SKILLS

Mouse skills include pointing, clicking, double clicking, right clicking and drag and drop.

POINTING

This refers to moving the mouse pointer to a location on the screen.

CLICKING

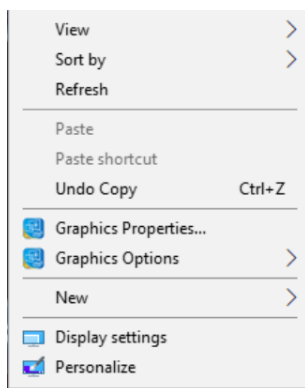
This refers to pressing and releasing the left mouse button once. It is used to select an item on the computer screen.

DOUBLE CLICKING

This refers to pressing the left mouse button twice in quick succession. It is used to open applications, files and folders.

RIGHT CLICKING

This refers to pressing the right mouse button once to show a context menu. It provides a list of commands to choose from. For example, right clicking on the desktop may show the commands as show in the diagram below.



DRAG AND DROP