Group: A –

INTRODUCTION TO ICT

Topic 1

Background

- The topic introduces the learner to computers, their use and implications of using them in a variety of fields. It is developed bearing in mind that most of the learners might be encountering the subject for the first time. They need to attain the background knowledge to the use of computer systems across a number of fields. The topic lays a foundation to the rest of the topics. It should be well handled to give the learners a solid foundation in the subject.
- **Learning Outcome:** The learner should be able to describe the application of Information and Communication Technologies (ICTs) in society.

Presentation Outline

UACE Sub – ICT **Topic 1:**

Introduction to Computing

- Sub Topic 1.1: World of ICTs
- Sub Topic 1.2: ICT Literacy
- Sub Topic 1.3: Computer File Management

Sub Topic 1.1: World of ICTs

- **Sub topic Objectives:**

1.1.1 Describing a computer.

1.1.2 Identifying different parts of a computer and their uses.

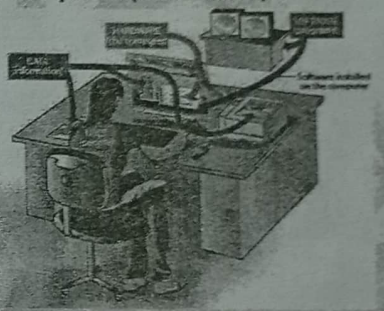
- 1.1.3 Making a distinction between information and data.
- 1.1.4 Describing the information processing cycle.

1.1.1 Describing a computer.

- **A Computer is electronic device that receives data, processes data, stores data, and produces a result (output).**
- A **computer system** is more than a box with components; it encompasses four elements that make the machine fully useful:
  - Hardware
  - Software
  - Data
  - Users

1.1.2 Parts / Components of a Computer

- **Computer System (Illustration)**

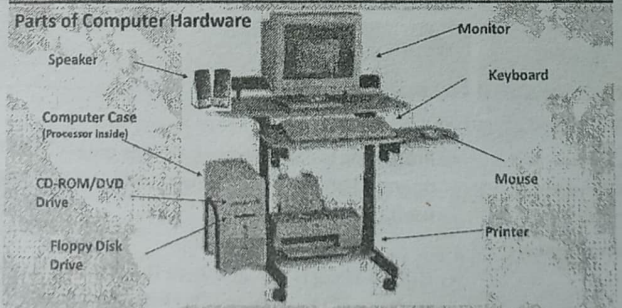


1.1.2 Parts / Components of a Computer

- **Computer Hardware**
- This is a term used to describe all the various physical devices of a computer.
- Computer hardware components are tangible (they can be touched).
- Computer hardware includes.
  - Input devices like the keyboard and mouse,
  - Processing devices like the Microprocessor Chip,
  - Storage devices like the Hard disks and the CDs,
  - Output devices like the monitor and the printer.

1.1.2 Parts / Components of a Computer

Parts of Computer Hardware



Can you name other devices that can work with a computer that were not listed?

1.1.2 Parts / Components of a Computer

- **Computer Software**
- Software is a term for electronic instructions that tell the computer how to perform a task.
- These are a series of programs (instructions) that tell the computer what and how to work.
- Computer software can be grouped into System software and Application software.
- System software like the Operating system (such as Windows, Linux, UNIX, DOS, Mac Os etc.) are used to manage and coordinate all the computer resources and activities.
- Application software (such as Games, Calculator and Media Player, Word Processors, etc.) solve the specific or exact needs of the user.

CHARACTERISTICS OF COMPUTERS

- Modern computers today have the following characteristics:
- **Speed:**—Computers operate at very high speeds which is measured in millions of instructions per second (MIPS).
- **Automatic (Spontaneous):**— computers work automatically, they do not need any supervision in order to perform tasks when instructed.
- **Accuracy:**—Computers are very accurate. The errors in computing are due to the people using them but not technological weakness.
- **Diligence (Endurance):**—Computers have the ability to perform the same task over and over for long time without getting tired. This is because a computer is a machine, and so does not have human behaviors of tiredness and lack of concentration.
- **Artificial intelligence:**—Computers can respond to requests given to them and provide solutions due to their programmability.
- **Storage:**—for a computer to be able to work, it must have some form of work space where data is stored before being processed. All information is stored on a hard disk or in the Random Access Memory (RAM).
- **Versatile:**—Modern Computers can perform different kind of tasks at the same time e.g. you can play music while typing a document at the same time. This is also known as multi-tasking.
- **Adaptability:**—Modern Computers can comply with different settings and environments. For example, they can be used as personal computers, for home use, banking, communication, entertainment, weather forecasting, space explorations, teaching, railways, medicine etc.
- **7.Need User input:**—Computers cannot initiate themselves and make the decisions. They need instructions from users to e ance the process. After all, a computer is only a machine.

MERITS OF USING COMPUTERS

- Computers can store a large amount of data for future use.
- Computers are able to communicate and share information with other computers.
- Tasks can be completed faster because computers work at a very high speed.
- Computers can processes large amounts of data and generate error free results provided that data is entered correctly.
- Tasks can be completed with little human intervention
- Computers increase efficiency and reliability in production.
- Running costs become low in the long run.

DEMERITS OF USING COMPUTERS

- Initial costs can be high.
- Extra costs are required to employ specialized personnel to operate and design data processing systems.
- Some jobs can be lost due to computerization.
- It leads to moral decay if not used properly especially the internet

1.1.2 Parts / Components of a Compu

- Computer Users
- Computer Users (Humanware) refers to the people who operate and initialize instructions to the computer system.
- They design and develop computer systems, operate the computer hardware, create the software, and establish procedures for carrying out tasks.
- There are two kinds of Computer Users;
- **Ordinary user** - is someone without much technical knowledge of computers but uses computers to produce information for professional or personal tasks, enhance learning, or have fun. Ordinary users include Computer students, Typists (Secretaries), etc.
- **Professional user** -is a person in a profession involving computers who has had formal education in the technical aspects of computers; Examples include Computer programmers, webmasters, etc.

1.1.3 Computer Data and Information

- Data refers to raw facts and figures used to create information
- This is entered into the computer by the user via input devices, in a form suitable for processing.
- Data may consist of characters, symbols, sounds and graphics, videos etc.

1.1.3 Computer Data and Information

- **Computer Information** refers to the processed data that makes meaning and is useful.
- For example the figure 10082006 may be input as data, but once this same figure is converted to the format 10/08/2006, you realize that it's a date.
- Computer Information is organized into **files**, which are collections of data grouped together and given a name
- A file that a user can open and use is often called a **document.**

1.1.4 The Information Processing Cycle

- The **information processing cycle** is a series of steps the computer follows to receive data:
  - **Input:** The computer accepts data from some source
  - **Processing:** The computer's processing components perform actions on or with the data
  - **Output:** The computer provides the results of its processing
  - **Storage:** The computer stores the results of its processing
- **Looking at the parts of the computer that we looked at, in what stage do you think each computer part would be listed under?**

INPUT STAGE

- This is the fundamental stage of data processing where the basic facts are fed into a computer using special input devices such as *mouse, keyboard, scanner and light pen and pencil*. It involves

1. **Collection of data**
   - This involves capturing of data from their sources and recording it onto some media e.g. using paper, video recording etc
2. **Sorting Preparation of data:** Involves arranging according to a given order
3. **Verification of data**
   - This involves copying and arranging data in a more convenient way for input, verifying the collected data and checking for mistakes
4. **Data Entry:** Involves actual keying in of data into the computer

PROCESSING & OUTPUT

- Processing is a stage where the raw data received from input stage is operated on by the application code and then transformed into useful information.
- Output Stage is a stage where the information extracted from the memory of the computer is given out through special output devices like the *monitor, printer, speaker* etc.
- **NB:** The processed data viewed on the visual display unit is called **softcopy** while processed data viewed as a print out is called **hardcopy**

STORAGE STAGE

- Information needs to be stored for future use. Computers use Hard disk drives, CDs/DVDs and other memory units to store processed information at this stage.

ADVANTAGES & DISADVANTAGES OF USING COMPUTER SYSTEM FOR INFORMATION PROCESSING

ADVANTAGES

- Enormous amounts of data can be stored permanently for future use
- Computers can process large amounts of data and generate error free results provided the data is entered correctly
- Large number tasks can be processed at very fast processing speed eg. mathematical calculations
- Efficiency and productivity in information processing can be realized
- Tasks can be completed with minimal human intervention
- Sharing of data and information is possible when the comp[illegible]rs have communication capabilit[illegible], i.e. networked environment

DISADVANTAGES

- The initial invest costs are high, such as costs on computers, skilled labour force and software
- It may lead to an employment as jobs may be lost due to computerization
- The networking environment is susceptible to human abuse. Personal information can easily be accessed by hackers pirates if not secured by anti virus guards, firewalls etc
- Face to face interaction among people, staff may be reduced

Sub Topic 1.2: ICT Literacy

Sub topic Objectives:

1.2.1 Explaining the meaning of ICTs.

1.2.2 Justifying the use of ICTs in society in..

- business
- education
- health
- security
- politics and governance
- art, leisure and entertainment
- industrial, technical and scientific uses

1.2.3 Searching the Internet.

1.2.1 The meaning of ICTs

- ICT Literacy is the ability of the user to know how to use ICT tools. Can be a beginner, intermediary or expert.
- The term Information and communication Technology (ICT) combines three items i.e. [information, communication, and technology]
- Communication in this regard refers to the electronic transfer of data from one point to another.
- Technology refers to the technique and way of doing something.
- What is Information? We shall define this ahead...

1.2.1 The meaning of ICTs

- **GENERAL DEFINITON:** Information and Communication Technology (ICT) refers to the broad range of hardware, software, network infrastructure and media that enable the processing, storage and sharing of information among humans and computers, locally and globally"
- ICT devices range from radio, television, cellular phones, compact disks, Fax machines, computers, biometric devices, internet and network hardware and software platforms, satellite systems and so on. It involves to all means which facilitate information or data capture processing storage and output.

1.2.2 The use of ICTs in society

- Today people use ICTs in almost every walk of life.
- However, along with these advancements of science there arises the dilemma of development of technology as it affects human individuals.
- They have come with both positive and negative impacts to our society.
- Computers are applied in the areas of
- 1) Education,
- 2) Business,
- 3) Health,
- 4) security,
- 5) Politics, E.t.c
- 6) Communication,
- 7) Entertainment / leisure,
- 8) Technical and scientific uses

1.2.2 The use of ICTs in society

Uses of ICTs In the Area of Education

- In education, we use Computer Assisted Instruction (CAI), Computer Aided Learning (CAL) and Computer Aided Assessment (CAA)
- Schools use computers to create school websites for sharing information with the public.
- Productivity tools like desktop publishing and presentation software are used in projects and other school activities.
- Computers are used for calculating mathematical arithmetic by students and teachers in class.
- Students' Report Cards can be produced electronically by use of computers instead of hand written ones.

1.2.2 The use of ICTs in society

Uses Of ICTs In the Area of Education

- With Use of School Administration and Management Systems. (SAMS) Records management is made easier because all details of learners can be held on computer, and easily retrieved, reducing administrative costs.
- Distance learning through computer based training. People get award such as degrees without going to class.
- Teachers use simulation software to perform difficult or dangerous experiments in class.
- Use of special facilities for students with disabilities like text to speech and speech recognition to help blind students.

1.2.2 The use of ICTs in society

Uses of ICTs In the Area of Business

- Computers enable people to Working from home, using a computer connected to the employer's network or via the Internet. This is known as Telecommuting.
- Computers have created more jobs such as Computer technicians, Computer teachers, etc.
- Buying and selling Computers and its components is a source of income to individuals, and companies.
- Through, Computer Aided Design (CAD), scale drawings, and excellent designs can be created easily.
- Computers are used for sending and receiving Mobile Money and making world wide money transfers.

1.2.2 The use of ICTs in society

Uses Of ICTs In the Area of Business

- Banks use Computers to manage transactions and Automatic Teller Machines ATMs for 24 hours banking.
- Computers help in Business Advertisement through creating websites, internet, flyers, brochures and billboards.
- Computers are used in typesetting business for production of document printouts and publication of Books for sale.
- Computers are used for E-Commerce: the sale of goods and services over the internet.

1.2.2 The use of ICTs in society

Uses Of ICTs In the Area of Health

- Hospitals use computers for managing and storing Records electronically, rather than paper files.
- Hospital Administration is also aided by printing labels, allocating beds, make appointments, staff rotas, etc.
- Internet helps us get Web sites for information on health care, treatments, conditions, etc.
- Monitoring/Diagnosis such as Heart rate, blood pressure, etc. is aided by Computer Expert systems.
- Medical Training is facilitated by Simulation software and on-line data sources.

1.2.2 The use of ICTs in society

Uses Of ICTs In the Area of Security

- Computers aid monitoring security through cameras, Automatic number plate recognition, etc.
- Communication systems are widely used in the military to coordinate the personnel.
- Some computer systems can detect temperatures and alarm in case of danger of fire outbreaks.
- Computers are used for capturing data for Police National Computer Databases – , vehicle number plates, criminals fingerprints, etc.
- Computers are used to detect presence of illegal devices such as bombs.
- Computers are also used for controlling dangerous weapons such as missiles.

1.2.2 The use of ICTs in soci

Uses Of ICTs In the Area of Politics

- Paying government tax online through a government website
- Online forms such as vehicle registration and passport forms
- Advertising government tenders and Applying for government tenders
- Public records - A maintained database of statistical information such as electoral register and census data can be availed online.
- Use of electronic voting during elections
- Government departments can use a computer based platform to get feedback from the citizens.

1.2.2 The use of ICTs in society

Uses of ICTs In the Area of Communication

- E-mail: Electronic Mail sent from one person to another using connected computers helps a lot in the area of communication.
- Video Conferencing enables people in different locations to conduct meeting as if they are in the same location.
- Computers are used for Faxing: Sending an image of a document electronically.
- Computers enable people to send voice, image, text and data though telephones and mobile cell phones.
- Social Networks such as Facebook, and Twitter enable people to stay in touch with their relatives, friends and interests.

1.2.2 The use of ICTs in society

Technical and Scientific Uses of ICTs

- In Astronomy, Computers are essential tools to study the behavior of the complex systems in space as regards to their movements, interactions etc.
- Through Computer Aided Manufacture (CAM), computers can be used to control the production of goods in factories.
- Computers perform Telescope pointing and tracking (including error correction), Camera operation, image download and storage, Image reduction (the measurement of the image), and Data processing.
- Monitoring highway traffic
- Computers are used to tell schedules of water vessels, train, buses to their respective stations. You only need to use your PDA device or cello phone and check it out.
- Computers are used very extensively in design of roads. Roadways and bridges are designed using software programs like CAD etc.

1.2.3 Searching the Internet

- The internet is a global connection of computer networks.
- The internet connects together billions of computers and other ICT devices, to exchange and share information all over the world.
- To find the information that we want, we search or **'browse'** or **'surf'** the **World Wide Web (WWW)**.
- The WWW is a service on the Internet that consists of Websites, containing **hyperlinked** electronic documents (webpages) with different kinds of information.

1.2.3 Searching the Internet

- You can open a Web page by entering a Web address in the Address bar of a web browser.
- A URL (Uniform Resource Locator) is another term for Web address. Web addresses uniquely identify websites on the www, for example http://www.newvision.co.ug
- Web browsers are software programs that are used for displaying Webpages on computers.

Examples Include:

- – Mozilla Firefox,
- – Internet Explorer,
- – Safari,
- – Opera
- – Google Chrome, etc.

1.2.3 Searching the Internet

- If you don't know the URL of the website you want to visit, you can use a web search engine
- Search Engines are Software programs or systems that look through the www to locate sites matching a keyword entered by the user.
- **Keyword:** A string of letters or words that indicates the subject to be searched.
- Popular search engines include Yahoo, Bing and Google.(www.google.com)

Microsoft Internet Explorer web browser displaying the webpage for the Google search engine.

PRACTICAL ACTIVITY: Open a web browser and use the Google search engine to search about the various uses of ICTs in society today.

Sub Topic 1.3 Implications of Using ICTs

- **Sub Topic Objectives:**
- Discussing the implications of using ICTs.
  - – social / ethical
  - – economic
  - – political
  - – environmental (Green Computing)
  - – security, reliability and resilience of computer systems
- 1.3.1 Positive Implications of Using Computers to Society
- 1.3.2 Negative Implications of Using Computers to Society
- 1.3.3 Health concerns of computer use
- 1.3.4 Green Computing
- 1.3.5 Security, reliability and resilience of computer systems

1.3.1 Positive Implications of Using Computers to Society

- Computers have Created and widened employment opportunities e.g.; software engineers, computer teachers, technicians, etc.
- Improved education and research by simplifying teaching and learning. E.g. abstract content can be made real through cyber science technology – others are computer aided teaching and computer aided learning, presentations software, etc.
- Improved entertainment and leisure through computer games, music, etc for people to refresh and make-up.
- Improved communication and collaboration through computer networks. Improved health services where computers facilitate recording, monitoring, and diagnosis for patients.

1.3.1 Positive Implications of Using Computers to Society

- Improved security through computer managed gates and monitoring of commercial and domestic premises, detecting and controlling crime by police.
- Reduced production time and manufacturing processes through computer aided manufacturing and computer aided designing which have greatly improved the quantity and quality of life.
- Improved customer services delivery and care eg networked computers provide 24/7 on-line services like credit cards Improved business and investment opportunities.
- Improved data and document production, storage and manipulation.

1.3.2 Negative Implications of Using Computers to Society

- Computer related crime e.g. forgeries, cyberbullying, Piracy etc.
- Increased cost of production as computers are very expensive to buy and maintain. Computer experts can as well be expensive to hire.
- They are many health hazards e.g. can cause eye defects, Tendonitis, RSI, etc.
- Electronic fraud: Stealing money electronically through practices like Credit card cloning and illegal money transfers.
- Impact on Environment: Computer manufacturing processes and computer waste are depleting natural resources and polluting the environment.
- Hacking: Unauthorized access into computers possibly to access information, compromising privacy. e.g. Wikileaks
- Virus threats which has made data storage and safety very unreliable.

1.3.2 Negative Implications of Using Computers to Society

- Loss of employment as they take over job assignments for semi and less skilled job functions.
- Deaths and accidents due to computer malfunctioning or explosion.
- Erosion of human integrity and creativity as even the smallest calculation is assigned to the computer. Other cases are Forgeries, GMFs, test tube children, etc.
- Loss of man-hours as some workers go for unproductive computer based leisure at the expense of their work. Cyber terrorism.
- Moral Decay: The internet has websites with content such as pornography, which have a bad impact on the users especially the young children.

1.3.3 Health concerns of computer use

- The widespread use of computers has led to some important user health concerns:
- People who spend their workday using the computer sometimes complain of lower **back pain, muscle fatigue, and emotional fatigue.**
- A **repetitive strain injury (RSI)** is an injury or disorder of the muscles, nerves, tendons, ligaments, and joints. Computer-related RSIs include tendonitis and carpal tunnel syndrome.
- **Tendonitis** is inflammation of a tendon due to some repeated motion or stress on that tendon.
- **Carpal tunnel syndrome (CTS)** is inflammation of the nerve that connects the forearm to the palm of the wrist. Symptoms of CTS include burning pain when the nerve is compressed, along with numbness and tingling in the thumb and first two fingers.

1.3.3 Health concerns of computer use

- Factors that cause these disorders include prolonged typing, prolonged mouse usage, or continual shifting between the mouse and the keyboard.
- ***NB: If untreated, these Tendonitis and CTS can lead to permanent physical damage.***

Hand Exercises

- Spread fingers apart for several seconds while keeping wrists straight.
- Gently push back fingers and then thumb.
- Dangle arms loosely at sides and then shake arms and hands.

1.3.3 Health concerns of computer use

- Eye strain and CVS:
- Another type of health-related condition due to computer usage is **computer vision syndrome (CVS).**
  - You may have CVS if you have sore, tired, burning, itching, or dry eyes; blurred or double vision; distance blurred vision after prolonged staring at a display device; headache or sore neck; difficulty shifting focus between a display device and documents; difficulty focusing on the screen image; color fringes or after-images when you look away from the display device; and increased sensitivity to light.

1.3.3 Health concerns of computer use

Techniques to Ease Eyestrain

- Every 10 to 15 minutes, take an eye break.
  - Look into the distance and focus on an object for 20 to 30 seconds.
  - Roll your eyes in a complete circle.
  - Close your eyes and rest them for at least one minute.
- Blink your eyes every five seconds.
- Place your display device about an arm's length away from your eyes with the top of the screen at eye level or below.
- Use large fonts.
- If you wear glasses, ask your doctor about computer glasses.
- Adjust the lighting.

1.3.3 Health concerns of computer use

Computer Addiction

- Computers can provide entertainment and enjoyment. Some computer users, however, become obsessed with the computer and the Internet. Computer addiction occurs when the computer consumes someone's entire social life. Computer addiction is a growing health problem but can be treated through therapy and support groups.

Symptoms of a user with computer addiction include the following:

- Craves computer time
- Irritable when not at the computer
- Overjoyed when at the computer
- Unable to stop computer activity
- Neglects family and friends
- Problems at work or school

1.3.3 Health concerns of computer use

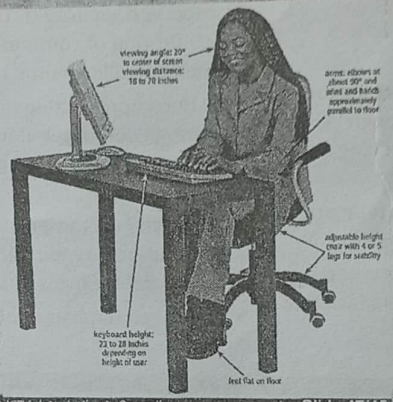
Ergonomics and Workplace Design

- Ergonomics is an applied science devoted to incorporating comfort, efficiency, and safety into the design of items in the workplace.
- Ergonomic studies have shown that using the correct type and configuration of chair, keyboard, display device, and work surface helps users work comfortably and efficiently and helps protect their health.

1.3.3 Health concerns of computer use

Ergonomics and Workplace Design

- For the computer work space, experts recommend an area of at least two feet by four feet. Figure below illustrates additional guidelines for setting up the work area.



1.3.4 Green Computing

- Green computing involves reducing the electricity and environmental waste while using a computer. People use, and often waste, resources such as electricity and paper while using a computer.
- The United States government developed the ENERGY STAR program to help reduce the amount of electricity used by computers and related devices. This program encourages manufacturers to create energy-efficient devices that require little power when they are not in use. Computers and devices that meet the ENERGY STAR guidelines display an ENERGY STAR label.
- Computers, monitors, and other equipment contain toxic materials and potentially dangerous elements including lead, mercury, and flame retardants. In a landfill, these materials release into the environment. Recycling and refurbishing old equipment are much safer alternatives for the environment.

1.3.4 Green Computing

- Below are other green computing suggestions

Green Computing Suggestions

1. Use computers and devices that comply with the ENERGY STAR program.
2. Do not leave the computer running overnight.
3. Turn off the monitor, printer, and other devices when not in use.
4. Use LCD monitors instead of CRT monitors.
5. Use paperless methods to communicate.
6. Recycle paper.
7. Buy recycled paper.
8. Recycle toner cartridges.
9. Recycle old computers, printers, and other devices.
10. Telecommute (saves gas).
11. Use video conferencing and VoIP for meetings.

1.3.5 Security, reliability and resilience of computer systems

- **Resilience** is the fast recovery from a degraded system state. Computer networking community defines it as the combination of tolerance and trustworthiness (dependability, security, performance and survivability) of computer systems.
- The electronic components in modern computers are dependable and reliable because they rarely break or fail.
- Organizations today often have a chief security officer (CSO) who is responsible for the physical security of an organization's property and people and also is in charge of securing its computing resources. It is critical that the CSO is included in all system development projects to ensure that all projects adequately address information security.
- The CSO uses many of the techniques to maintain confidentiality or limited access to information, ensure integrity and reliability of systems and ensure uninterrupted availability of systems.

COMPUTER FILE MANAGEMENT

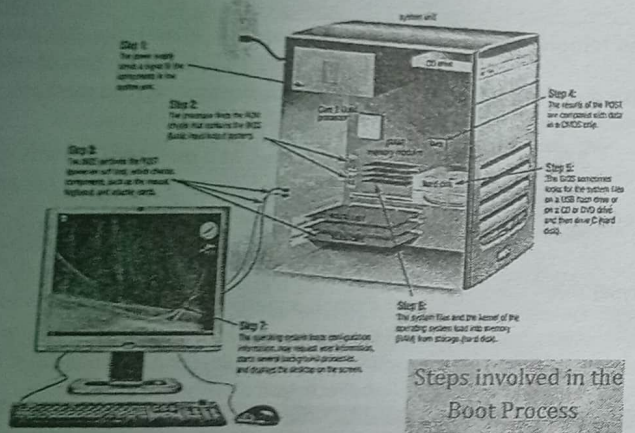
Presentation Outline

Topic 1.3: Computer File Management

- Sub Topic 1.3.1 Booting Process
- Sub Topic 1.3.2 File Management
- Sub Topic 1.3.3 Common Utilities
- Sub Topic 1.3.4 Print Management

1.3.1 Booting of a computer

- Booting (also known as booting up) is the initial set of operations that a computer system performs when electrical power is switched on.
- Booting is the process of starting up a computer. During Booting, the operating system (OS) loads from disk into working memory (RAM).
- The process begins when a computer is powered on and ends when the computer is ready to perform its normal operations.



Steps involved in the Boot Process

Steps involved in the Boot Process

1. The power supply sends a signal to the components in the system unit.
2. The processor finds the ROM chip(s) that contain the BIOS (Basic input/output system).
3. The BIOS performs the POST (Power-On Self Test) which checks components such as the mouse, keyboard and adapter cards. A series of messages may display.
4. The results of the POST are compared with data in a CMOS chip
5. The BIOS looks for system files on the boot device.
6. The system files and the kernel of the Operating System load into RAM from the boot device.
7. The OS loads configuration information and displays the welcome screen.

Boot Drives

- Boot Devices / boot drive is the device/drive from which the operating system is loaded.
- In most cases, drive C (the hard disk) is the boot drive.
- The computer BIOS (Basic Input/Output System) supports booting from various devices.
- These include the local hard disk drive, optical drive, floppy drive, a network interface card, and a USB device. The BIOS allows the user to configure a boot order.

Types of Booting

- There are two types of booting: Cold booting and warm booting.
- **Cold booting** is the process of starting up a computer which has been completely off. Usually, it is initiated by switching on the power supply buttons on the monitor and system unit /box respectively.
- **Warm Booting** is the process of restarting a computer which is already running. It is also called rebooting.

Reasons for warm booting

- **New software installations:** When you install new software, often an on-screen prompt instructs you to restart the computer.
- **New hardware installations:** When some hardware devices like disk drives and printers are attached, the computer might request for a reboot to reload them effectively.
- **After Updating Software:** Computer software and operating system can trigger a reboot as well; more specifically, Microsoft Windows operating systems are outfitted with automatic updates that can be scheduled to run at a certain time and date; therefore, a reboot necessary in this case.

Reasons for warm booting (cont)

- **During Troubleshooting:** Rebooting may be used by users, support staff or system administrators as a technique to work around bugs in software. A warm boot is sometimes necessary when a program encounters an error from which it cannot recover.
- **Switching operating systems:** On a multi-boot system without a hypervisor, a reboot is required to switch between installed operating systems.
- **When the computer is freezing:** A warm boot can be necessary when the computer is responding slowly especially when many programs have been loaded into memory.