INFORMATION

COMMUNICATION TECHNOLOGY

These notes are more simplified to enable learners in the advanced level pass paper 1 of the information and communication technology with ease

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TOPIC 1: INTRODUCTION TO COMPUTERS

A computer is an electronic multi – purpose machine that is capable of accepting data, storing data, processing data and finally outputting information through its output devices in a form that is usable by humans.

PARTS OF A COMPUTER SYSTEM

PARTS OF A COMPUTER

1. **The monitor:** This is a device which shows/gives the soft copy of the data/information in the computer screen. There are two basic types of monitors: CRT (cathode ray tube) monitors and LCD (liquid crystal display) monitors. Both types produce sharp images, but LCD monitors have the advantage of being much thinner and lighter. CRT monitors, however, are generally more affordable.
2. **Keyboard.** It's an input device that converts letters and other characters into electric signals readable by the processor. It has a type writer area, function keys, cursor movement keys and numerical keypad. It's a device which enables a computer user to communicate to the computer system.
3. **Mouse**. This is a hand held pointing device which is used to point, select, move and draw object in the computer screen. Examples of mice include: codeless, touch pad (touch tone pad), mouse stick/wired.
4. **Printers**. These are devices which gives a hard copy of the soft copy of the data or information held in the computer. Printers are output devices that produce text and graphics on paper. The two main types of printers are; impact printers (dot matrix,

Daisy wheel) and non-impact printers (laser jet, ink-jet, thermal printers etc.)

5. **Speakers**. Speakers are output devices used to play sound. They may be built into the system unit or connected with cables. Speakers allow you to listen to music and hear sound effects from your computer.
6. **System unit;** is an enclosure that contains most the computer components. Or is a casing /box that houses the internal electronic components
7. **CD/DVD Drive.** This a computer hardware device that reads compact discs and DVDs
8. **Hard drive.** This is the storage media of a computer. It is categorized into two; internal and external.
9. **The computer system.** A computer system is the set of interrelated elements working together in an integrated way to achieve a set objective.

   There are four main components of a computer system are;

   i. **Computer hardware; this** refers to the physical or tangible parts of a computer.

   ii. **Computer software;** these are instructions or programs a computer must follow to accomplish a task.

   iii. **Data**; these are raw material that are fed into the computer to be processed.

   iv. **Human ware or live ware**; this is the user or a person who operates the computer.

REASONS FOR STUDYING COMPUTER

- To acquire general knowledge and skills in the use of computers and related technologies
- To use the acquired knowledge in computer studies to enhance learning other subjects
- To understand important issues of a technology based society and exhibit them using computers
- To acquire knowledge as a foundation for further studies in computer technology
- To use a variety of computer technologies to assess, analyze and interpret information
- Jobs
- Passing exams

COMPUTER MODELS

Dell, Acer, Compaq, Macintosh, IBM (International business machine),

Toshiba, Samsung, Hp, Sony, apple etc.

CHARACTERISTICS OF MODERN COMPUTERS

- **Speed**: computer is quite fast in their operations in that their speed is measured in millions instructions per second i.e. the computer is capable of processing 15 million instructions per second
- Accuracy: computers are known to be accurate that they hardly make any mistake. So for computers if wrong data is fed in it then expect wrong information as the principle of **GIGO**
- Storage: for a computer to work it must have a work area or work space where data is stored before and after processing. The space is known as memory
- Diligence. Ability of computers to perform related tasks repeatedly without getting tired or bored.
- Artificial intelligence: computers are artificially intelligent as they can respond to requests given to them and provide solutions. This is done by its programmability i.e. can be taught to make decisions and functions accordingly
- Automation: computers also work automatically; they do not need to be reminded to perform any of the instructions when executing a programmed routine. E.g. making a routine daily alarm at specific times
- Versatility: computers can be able to do many tasks at the same time e.g. playing music, typing a document and browsing internet at the same time

COMPUTER SPECICFICATIONS

There are several computer systems available on the market that can be acquired as office or personal computers. However, depending on the purpose and period for which the computer will be used then care should be taken when choosing such a computer.

What to consider when purchasing a computer

- The computer platform. Here you consider which type of microcomputer would you like to buy it Toshiba, Macintosh, hp or IBM
- Hard disk size. The choice of a hard disk mainly depends on several factors i.e. the tasks that the computer will be used whether the operations will keep on increasing requiring more memory or will be constant.

- Display device. Currently there are two types of displays i.e. CRT and LCD. CRT occupies bigger space and consumes a lot of power whereas LCD is better.
- Expansion slots. Expansion slots are found on desktop computers which provide space for expansion cards (add-on-cards) that might have ports for additional peripheral components like TV cards.
- Sound Card. When planning to work with multimedia packages, especially sound, an appropriate card has to be sought of.
- Modems. These are used to transmit data to and from the computer. So you have to consider whether the modem is capable of both wireless and wire internet connection
- PC Casing. This refers to the physical structure of the box that contains and shields the working components of a computer **i.e.** do you need a tower casing or standard desktop casing.
- PC case molding. Which sharp and design do you want
- Cost

Ways of acquiring computers

- Direct purchase of a computer
- Hiring of a computer
- Lease of a computer

Distinction between data and information

Data: These are basic facts of any event in life such as costs, prices, date time etc. (unorganized facts) e.g. a list of students in a school irrespective of their classes, sex or age. Or **Data** can be defined as the raw materials we feed into the computer to be processed into information**.** E.g. typed names that have not been sorted **Information**: This is data that has been turned into a more meaningful form that would make immediate sense to any user i.e. processed data (organized facts). E.g. formatted document etc.

Qualities of good information

- It should be complete
- It should be clear

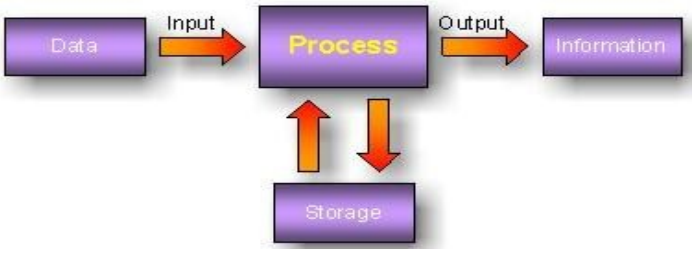
- Should be available whenever needed
- Relevant to its purpose

Information processing cycle

The sequence of events in processing information, which includes input, processing, storage and output

They are 4 stages of the information processing cycle:

- **Input**
- **Processing**
- **Storage**
- **Output**



Data is entered into the computer through input devices like the keyboard, then it is received by the main memory (RAM) which stores it temporarily as it awaits to be processed, it is then sent bit by bit to the central processing unit for processing and finally it is output through the output devices like a printer or stored on secondary storage devices like a hard disk.

SUB-TOPIC 1: World of ICT

ICT (information and communications technology - or technologies) is an umbrella term that includes any communication device or application, encompassing: radio, television, cellular phones, computers and network hardware and software, satellite systems and so on, as well as the various services and applications associated with them, such as videoconferencing, distance learning, Email and www etc.

ICT's can also be defined as diverse set of technological tools and resources used to communicate and create, disseminate, store and manage information. These technologies include; computers, the internet, broadcasting technologies (radio and TV) and telephones

Or

ICT refers to the technologies that provide access to information focusing mainly on communication technologies such as internet, wireless networks, cell phones, personal

computers and other communication mediums.

Examples of old technologies before the coming of ICTs

- News papers
- Film
- Recordings
- Paper printed photographs

Examples of new technologies that came due to ICT

- E-mail
- Video conferencing
- Internet
- Cellular phones
- Optical disks (CDs DVDs etc.)
- Databases
- Satellites etc.

Use of ICT's in society

- **Business**

1. Electronic Commerce: E-commerce is the use of telecommunications or the Internet to carry out business of any type. Common examples of e- commerce are business -to-business e -commerce, online shopping , online banking, online stock trading etc. One of the advantages of e- commerce is the reduction of transaction costs.
2. Translation services which are a key to a business wishing to expand overseas are offered. A business industry which is international, translation in terms of the written words and literature is extremely important. Translation software is used.
3. Direct mailing is a way in which production companies send material/ product information directly to potential customers. The aim is to focus on real customers rather than sending information to people who have very little interest in the product.

4. Tele-marketing is often used by media companies especially sales departments to generate appointments with potential customers. Often electronic versions of customer database lists are purchased allowing sales to contact potential customers directly.

5. Facilitating activities in the business sector such as manufacturing. There has been a shift from the old production system to a new mode which is facilitated by information and Communication technology. While the old production and manufacturing system is energy- intensive, standardized and departmentalized the new manufacturing system facilitated by ICT's is information intensive, customized, networked and integrated.

- **Education**

1. The online learning system is another web-based application that is revolutionalizing the learning platform of education. This system compliments the traditional face-to face teaching and learning format. In the on-line system, students can access class notes, submit assignment and also join a discussion group with other learners.

2. The education sector is arguably one major area that ICT's are playing remarkable role. These technologies are widely used in education as teaching aids and in research; they are used to access reference materials thus helping in facilitating learn ship and exchange of educational materials.

3. ICT's are helping library professionals store and manage academic information. Libraries have migrated from the traditional Dewey cataloguing system to an on-line system, which is a web-based cataloguing and search application.

4. The more commonly used internet communication is email. Used around workplaces and schools all across the world, this simple way of communication seems a necessity in today's society. Being able to send and receive messages, images and files in seconds, is now one of the most important systems of communication and without it work places, schools and companies may not be able to function properly.

- **Health**

- Medical automation by the use of ICT's offers a great assistance in the areas of:

- ✓ Automated diagnosis
- ✓ Electro-cardiogram screening and monitoring
- ✓ ICT's allow for access to otherwise inaccessible and expensive foreign expertise or labor and make it possible for hospitals in our country to use consultants or even surgeons in another country thereby saving patients from traveling.
- ✓ They support efficient exchange of information between health professionals, they enable transfer of patient records between sites and they can improve clinical effectiveness, continuity, and quality of care by health professionals.
- ✓ ICT's offer Special Needs (for the Physically Challenged). For many people with physical disabilities, ICTs can be extremely useful in providing access to communication, education and open up opportunities for them. Most telecommunications infrastructures are now being designed with the capabilities of meeting the special needs of the physically challenged. For instance, the Short Message Service (SMS) can be used to send and receive messages by the hearing impaired; the voice activated dialing service can be used by visually impaired.

- **Security**

- Computers keep law and order, fight crime and offer security and defense. Police are now able to keep databases of fingerprints which are automatically analyzed by computers. The police use this database to keep track of all investigations.
- In addition, it also holds information about criminal records and previous convictions. When information is needed about specific criminal, information could travel from one police station on one side of the country to another police station on the other side of the country in a matter of seconds thanks to the internet communication.
- Also computers based on face recognition and analysis, help the police force in leading to arrest of traffic offenders and criminals.
- In defense, ICT's such as computers are used in electronic intelligence gathering,

efficient communication, detection and tracking of targets, radar systems warning systems and military laser guided missile systems etc.

- **Politics and governance**

  - ICT's are used as sources for obtaining information. For example, political candidates provide statements of their policies on their websites, and possibly, a link to their full manifesto, free access to information on a particular political issue is a pre-requisite for engaging in public debate, and such debate is desirable prior to political action like mass demonstrations.
  - Participating in decision making. The most obvious way in which citizens participate in political decision-making is when they cast their vote for their government representative. ICTs could make the voting process more convenient by enabling electronic voting over the Internet from anywhere. This would also speed up vote counting.
  - ICT's are heavily used in many government ministries such as finance, planning, education etc. to store government records and improve the efficiency within the civil services.

- **Leisure and entertainment**

  - There is entertainment information for those looking for leisure as well as host games for youngsters.
  - Computers have been programmed to play games such as prince and chess.

- **Communication industry**

- Communication is possibly the most regularly used area of ICT; it is used by millions every day. From social networks to email, Internet communication is vital in today's society. Social networks such as Face book and Twitter are used by billions of people each day; the sites can be used to keep in touch with friends and relatives, to display photos or pictures or just to tell the world what you are up to.
- Still In communication industry, every telephones exchange today relies on computers to switch incoming and outgoing calls.
- Railway corporations rely heavily on ICT's to co-ordinate the movement of their wagons and goods

- In the airline industry, computers are heavily used in air traffic control and surveillance of air space using radar equipment as well as for reservation purposes.
- Shipping and cruise liner industries utilize computers to speed up cargo handling and passenger booking.
- This has been one of the most recognized uses of the ICTs. Various communication technologies, ranging from broadcasting to telecommunications and to the Internet are playing effective roles in the acquisition and sharing of information. The concepts of the information revolution and information society are driven by enormous advancements in ICTs and their application. The Internet for example, has provided platforms for sharing information in applications such as the E-Mail and The World Wide Web.

SUB-TOPIC 2: Implications of using ICT

Social

Positives

- Ease of access and availability
- Look at how modern ICT allows citizens today to communicate and participate in society. We use text messaging to vote on TV shows, enter competitions and have our opinions broadcast on national TV and radio. We use digital TV to order goods, vote on TV shows etc.
- We can have access to the Internet in our social lives as well with libraries having Internet access points and Internet cafes still being popular. Restaurants often have Internet access points and if you have stayed in a 'big' hotel lately you will find that the rooms have Internet access points for your laptop to plug into.

Information rich/information poor

There is some concern that the widespread use of computers is dividing society into two kinds of people – the 'information rich' and 'information poor'. The information rich have easy access to computers and electronic communications. They get information and news from the Internet and buy the latest products through on-line shopping. They are able to follow computer-

based learning and skills training courses at home, and look for jobs that are advertised solely on the Internet. They tend to find it easier to get well-paid jobs and will enjoy a more comfortable and secure life-style.

The information poor don't have easy access to computers and don't have the IT skills and confidence to take part in teleshopping, telebanking, and Internet chat and news groups. As corporations like the BBC seek public opinion on current matters increasingly via the Internet, the voices of the information poor may not be heard. The jobs on offer to them will be less skilled, paid less and much more insecure.

One effect of high levels of unemployment has been that families feel more secure with two wages coming into the family. This has meant that more and more mothers have careers. As a result, they may not have any children till they are thirty or older and even then they may only have one child because they do not want, or are afraid, to interrupt their careers.

More and more families enjoy television, computers and electronic games in their homes. Father may be watching television; mother may be teleshopping over the Internet while the children are in their bedrooms playing arcade games. Research has shown that families are spending less and less time together.

In addition, with the growth of teleworking, fewer people are meeting with colleagues to discuss business matters during the day. Computers are having an adverse effect on human communication skills and relations within the family and in society in general.

Educational qualifications and ICT; There have been qualifications in computing since the early 1960s, but these were solely in universities and colleges. Now there are many different courses offered at degree and NC level all related to ICT.

- **Economic**

Another less obvious effect of computers and IT on the family is the change that banks have made to our lives. Before banks were computerized, most workers were paid weekly and in cash, and they did not need a bank account. With the introduction of computerization, banks started to persuade companies, government and local authorities to pay employees by cheque. As a result, very little cash is in circulation now compared with the 1950s and 60s

because now people work with 'plastic money.

- **Political**

✓ Environmental (green computing) the study and practice of designing, manufacturing, using, and disposing of computers, servers, and associated subsystems—such as monitors, printers, storage devices, networking and communications systems efficiently and effectively with minimal or no impact on the environment.

✓ ICT's such as internet are used to predict and track climate changes in agriculture, the incidence of forest fires, flood and drought patterns, the movement of invasive species just to name a few and develop appropriate management and adaptation strategies, and plot a course toward better environmental management.

✓ ICT's applications can be used to impart information directly to farmers and the farming community. There are expert system designed to handle agricultural issues such as water utilization and management, pest control, harvest management and so forth.

Other positive implications of ICT

♦ Increased interactions or collaborations through emails, chat rooms, video conferencing etc.

♦ Increased inventions innovations such as wireless keyboards, wires mouse

♦ Improved and sustained quality goods and services due to automated production

♦ Improved corporate image i.e. firms use ICTs to create logos and headed letters

♦ Many IT products for the disabled are being created i.e. Baillie Keyboards

♦ Increased investment opportunities in commercial telephone centers, internet cafes, chat room

♦ Creation of jobs that require high skills e.g. IT technicians, computer operators, website designers, software developers

Negative implications of ICT

♦ Widens the gap between the information rich and the information poor as the rich

produce products faster on the market than the poor

- Isolates older people since they do not find it easy to learn and use ICT gadgets very fast
- ICT avails people with lots of good and bad information from the internet
- Increased learning instability as people are compelled to learn new technologies that come up every now and then
- Reduced physical activities which in turn creates lots of health problem e.g. eye strain, back problems etc.
- Erosion of individual privacy as more and more people's private data is being stored in databases was others can access any time.
- Increased unemployment as less skilled people get retrenched and their jobs taken over by more effective ITs like Robots in factories
- Addiction to computer usage (internet, music, Games etc.) is on increase
- The initial maintenance and ICT facilities is very high e.g. internet access bills
- Virus threats as there is easy spread of virus through networking
- Increased computer crimes i.e. hacking, phishing, software piracy etc.

TOPIC 2: COMPUTER MANAGEMENT

TERMS USED IN COMPUTER MANAGEMENT

1. **File** is a piece of information created by any computer software or program e.g. a document file, music file, photo file etc.
2. **Folder** is a virtual storage area of a file, a program etc. on a computer
3. **Icons** are small graphic images or pictures that represent a file, program, web page or a command
4. **Desktop** is the first computer screen display before any program is opened. It consists of different icons i.e. my computer.
5. **Booting** This means starting/restarting of a computer. There are two main ways of booting a computer i.e. cold booting and warm booting.
6. **Cold booting** is the starting of a computer from its off state from the mains. Involves switching on a computer right from the main power supply, stabilizer or uninterruptible power supply (UPS), the system unit and the monitor.
7. **Warm booting** is the restarting of a computer by either the restart button or pressing the following keys together and then releasing them at the same time **Ctrl+Alt+Delete.** Normally, a computer is warm booted after it hanged i.e. not responding to any command

SUB TOPIC 1: THE BOOTING PROCESS

- Power on and access the BIOS.
- The BIOS runs the complementary metal oxide semiconductor (CMOS) on the motherboard. CMOS helps to keep track of the current date and time (system time)
- The BIOS the runs Power-On self-Test (POST). POST checks whether all the basic hardware (RAM, Disk Drives, keyboard) are working properly.
- Once the above operation is complete, BIOS looks for an OS to load.
- The operating system is then loaded.

FILE MANAGEMENT

- A folder. It's an object that can contain multiple documents.

- A folder is a collection of files.
- A file or document is a collection of data that has a name and is stored in a computer. For example excel, Ms. Word, picture file.

Practical questions about a file

- Creation of a folder on a storage medium of a computer.
- Moving a folder to a desired location
- Deleting a folder

Practical questions about a file

- Identifying a file
- Saving a file in a desired location.
- using folders and sub folders to effectively categorize files
- Describing how to customize the desktop
- Explaining the major icons on the desktop

Types of files

- Text files, data files, program files, directory files etc. program files store files whereas text files store text.
- System files. These are sets of files that instruct the computer how to function. They usually have a file extension of .sys
- Program files; these are files that contain instructions which a computer carries out while performing a task. They usually carry an extension of .exe or .com
- Data files; these are files that contain text or numeric information and are created during the execution of a task using a specific computer program by the computer.
- Batch files; these are text files that contains a sequence of commands for a computer's operating system. They contain an extension of .Bat

File extension. Refers to the last three/four/five characters after the period (.) that make up the entire file name.

The file extension indicates what kind of file it is. For example, **Myfile.docx** is a file

with name Myfile and file extension .docx.

Some common file extensions include:

.doc - Microsoft office word 2003 document

.docx - Microsoft office word 2007 document

.xls Microsoftsoft office excel 97-2003

.xlsx - Microsoft office excel 2007

.rtf - rich text format

.pdf - portable digital format

.txt - plain text document like notepad

.jpg - an image file

.gif - an image file

.exe - an executable file, meaning an application/program/piece of software

.MP3, .WMA, .WAV, .AU, .AIF - Audio files

.ppt, .pptx, .pps - Presentation document

.htm/.html - a plain text document with added code that enables it to read on World Wide Web

Importance of a file extension

☑ Helps to identify the file type

☑ To identify the software type used to prepare the document

File path. It's a notation that indicates the location of a file on your computer.

Or

A group of letters occurring after a period (.) in a file name indicating the type of file

Example **D:\TextBook\ICT Essentials.docx**

-**D**: is the drive name

-**Textbook** is the folder on drive D

-**ICT Essentials** is the name of the file

-.docx is the file extension for Ms. Office word 2007.

In case the Textbook folder had a sub folder called **notes** in which the file is placed, the file path would appear as: D:\TextBook\Notes\ICT Essentials.docx

HOW TO RECOVER ACCIDENTLY DELETED WORK IN A COMPUTER

- ✓ You can restore from the recycle bin
- ✓ Use the undo command
- ✓ Use recovery software

CUSTOMIZING THE DESKTOP

This is the process of changing the different settings of how your computer screen display will look like i.e. setting screen saver, changing the wall paper, mouse pointer and setting different icons to appear on the screen

Practical questions

- ⏭ How to set a screen saver
- ⏭ How to set a wall paper
- ⏭ How to change the mouse pointer
- ⏭ How to disable some icons from being displayed on the screen

Major icons found on the desktop

When a computer starts, it displays different icons that work differently as explained below;

Recycle bin icon. It's an icon that represents a container for all deleted items from the computer or this is where deleted items are stored

My computer; It's the icon that represent computer hard disks i.e. local disk (D), local disk (C)

SUB-TOPIC 2*: *Common Utilities

Utility programs are system programs that are used to support and enhance the proper performance of an operating system.

Utility programs include:

1. *Backup programs.* ***These programs let you protect your files by making copies of them.***

2. Data recovery. These are programs used to restore data that has been physically damaged or corrupted.
3. Data compression programs are utilities which are used to remove redundant elements, gaps and unnecessary data from a computer's storage space. Due to very large sizes of files used in multimedia (graphics, sound and video files) data compression is used to reduce the storage space required and the time needed to transmit large files over a network. Debuggers. These are programs which correct errors in a computer program. A bug is an error in a computer program and to debug means to correct errors in a program
4. Defragmenters. Are programs which bring fragments of a file together for storage in one location in the computer memory?
5. Anti-virus programs. This software protects your system from viruses. They include; Mac fee, Avira, Avast etc.
6. Disk maintenance utilities like Norton disk doctor, scandisk etc. Are programs that detect errors on a computer disk and fix them

***SUB-TOPIC 3*: Print management**

- Selecting a printer
- Print a document

MODES OF PRINTING

1. Multiple page printing. This is where a user prints more than one page of the same document on a single sheet of paper
2. Multiple copies printing. This is where a user prints more than one copy of the same document
3. Handout printing. This is the mode of printing where multiple slides are printed on one page
4. Slide printing. This is the mode of printing where a single slide is printed covering the whole page

TOPIC 3: COMPUTER LABORATORY CARE AND MAINTENANCE

SUB-TOPIC 1: Computer literacy

Computer literacy is the knowledge and ability to use computers and related technology efficiently.

- ✓ Describe the booting process
- ✓ Start a computer system
- ✓ Open applications programs and using them effectively
- ✓ Assembling

SUB-TOPIC 2: Security lab environment

A computer laboratory is a room that is specially designed and prepared to facilitate the installation of computers and to provide a safe and conducive environment for using the computers.

Basic requirements for setting up a computer laboratory

a. UPS- Uninterruptible Power Supply

- ♦ If the power goes off, computer equipment must keep running. Even home computers need the time to shut down properly. Damage to devices and data can occur when there is sudden power loss or fluctuation.
- ♦ UPS, or Uninterruptible Power Supplies, provide power for devices in the event of a failure or other electrical problems.
- ♦ A UPS is essentially a small battery that keeps the power supply on for long enough for you to switch off the computer safely when there is a sudden blackout.

b. Air conditioner

- ♦ Air conditioning units monitor and maintain the temperature, air distribution

and humidity in a computer room.

- An Air conditioning unit is a device used for cooling and controlling the humidity and purity of the air circulating in a space.

c. **Fire extinguisher**

- Fire extinguishers are a critical component of saving property and lives in the case of a fire emergency.
- Owning a fire extinguisher is a form of ensuring safety.
- All computer rooms need it just in case a fire starts.
- It can save our property from burning because the use of the device will help prevent it from spreading and can even stop the flame in no time.

d. **Security camera**

- Security cameras act as a deterrent to theft and other crimes. Cameras monitor data centers or blind spots outside of doors / Surveillance

- Play back for reference purposes

e. **Blower**

Used to blow/remove dust that may have entered inside the computer

f. **Antiglare screens** Regulate excess light from monitors especially CRT monitors

g. **Water proof covers**. Protect computers from moisture, water and liquids.

h. **First aid box**

A first aid kit is a box or bag that contains the necessary items for providing emergency care. It is important to have first aid kits, because they allow someone who is injured, to be rapidly treated with basic first aid, before they can be properly treated at the local hospital.

i. **Wool carpet**

The wool carpet is used to trap dust that enters in the computer laboratory.

Prevent damage of devices when they fall down. Trap dust

Absorb moisture

Prevent electric shock

j. **Internet gateway**

An internet gateway is your modem or router or any other peripheral which allows you to access the internet.

k. **Burglar proofing**

Burglar proofing provides protection against any forced physical entry into the computer laboratory. Burglar proofing involves fitting metal grills in windows and doors.

SECURE COMPUTER LABORATORY ENVIRONMENT

- Protection against fire. Have gaseous fire extinguishers like those filled with carbon dioxide. Water based or powder extinguishers should be avoided since they can cause damage to computer components.
- Computers should not share the same power line with other office machines to avoid overloading the power units.
- **Cable insulation**. All power cables must be properly insulated and laid away from pathways in the room.

Lay them along the walls in trunks. This prevents electric shock and power disconnections caused by stumbling on cables.

- **Stable power supply**

Protect computers from being damaged and data loss due to power instabilities by having:

- Uninterruptible power supply (UPS)
- Power s stabilizers maintain power at required voltages
- A surge protector can be used to protect computer equipment against under voltage and over voltage.

♦ **Burglar proofing**

- Consider installing security alarms at strategic access points that would alert the security personnel in case of a break-in.
- Fit strong metallic grills and locks on doors, windows and strengthen the roof incase the roofing is weak.
- Use Desktop locks, system unit enclosures and laptop locks.

♦ **AIR CIRCULATION**

- Have good air circulation in the computer room since users and computers emit heat energy.
- This is possible through having enough ventilation points like windows, installing an air conditioning system.

- Avoid overcrowding of machines and users.
- All the above prevent suffocation and overheating.

- Lighting. A computer laboratory must be well lit with appropriate wall paints to avoid eye strain, headaches, stress and fatigue and always fit radiation filter screens to reduce light that reaches the eyes
- Standard furniture. Have standard furniture so that the tables are wide enough and strong to bear the weight of the computers and accommodate all peripherals. The seat for the user must be comfortable and have a straight backrest that allows someone to sit upright.

AREAS OF COMPUTER LAB SECURITY

a) **Physical security**. While setting up lab one should consider the following security measures.

- Employ security guards to keep watch over data and information centers.
- Apply burglar proof for the computer laboratory by reinforcing weak access points like windows, doors, roofing with metal grills and strong padlocks.
- Limiting access to computer ports where necessary
- Set up alarms to alert you in case of break-ins.
- Use system locks (locked key systems) to make it difficult to access internal components like hard disks and memory sticks.
- Use cables to lock the equipment to desk, cabinet or floor.
- Electronic locking mechanism with keys, swipe cards, finger print recognition.
- CCTV Cameras to keep watch over computer systems and centers.

b) **Software security measures**

- Computers shared by multiple users in a computer center should have security software installed to limit and block certain activities for example deep freeze.

- Remote administration software should be considered with high number of computers in a computer center.
- Computer management software to monitor and limit web browsing should be installed for example K9 web protection.
- Group policy or security software to prevent malicious software from being executed and installed.
- Assigning unique authorized log-in for authentication before granting network access.
- Computer covers
- Installation of alarm systems

c) **Electric power security.** One should use uninterruptible power supply and surge protectors to protect your computers from electric shocks

d) **Security cameras.** Install surveillance cameras/CCTV cameras that can help to record all happenings in the Lab in the absence of the in charge.

e) **Software based security.** This involves the use of unique authorized logins (IDs and passwords), prevention system software, antivirus, firewalls etc.

f) **First Aid Boxes.** This provides first aid to users in the Lab in case of an accident.

g) **Air conditioner.** This helps to cool the computers as they generate heat when working

h) **Fire extinguisher.** This is used to put off fire in case of any accident.

i) **Installation of smoke detectors** which can be used to detect smoke and alert member before the outbreak of fire

HOW CAN A COMPUTER LAB CAN BE USED SAFELY

Computer laboratories give many people access to computer programs, internet and other resources. Lab computers are used often by people with varying degrees of computer training. This means they are at risk from viruses, corrupt files, spyware, malfunction etc. so you have to maintain Lab computers regularly in order to ensure that they do not crash by doing the following;

- Plug all your computer equipment into a surge protector to avoid power spikes which can damage electrical equipment as well as lose user's data
- Set up a network layer firewall that will deny access to sites or programs that don't fit into the acceptable range
- Set up weekly updates or automatic updates for your lab computers i.e. update your programs regularly
- Install an up-to-date anti-virus program on the computers this will usually stop a computer from acquiring virus.
- Install an up-to-date anti-spyware program on your computers to stop spyware programs that install themselves onto a computer to gather personal information
- Back up your computers data on a regular basis so that if your computers become corrupted by a virus you can return to the previous backup to restore it
- Do not unplug printers, scanners and other connected machines when the computers are on i.e. eject any USB devices before unplugging them
- Ask your users to always press the Ctrl+Alt+Del buttons whenever their computers freezes rather than shutting it down with the power button
- Turn off all computers by selecting the shut down option on the desktop. A void pressing the power button to turn off computers
- Clean your computer lab regularly. The following are effective ways to clean a computer lab

  a) Dust computer screens using a thin soft microfiber cloth. Dedicate one cloth to be used only on the screen

  b) Use compressed air to clean out keyboards or you may use disinfectant spray to clean your key board

  c) Dust all parts that are found inside the system unit using a borrower

COMPUTER LABORATORY RULES AND REGULATIONS

Most institutions in Uganda have computer Labs with safety rules to follow when using them. There are a lot of machines and other equipment items kept in the Labs and it's absolutely necessary to ensure that no one carries out an action to damage the equipment. Below are some of the rules

- Install fire extinguishers to help in case of fire out break.
- Do not bring any food or drinks near the computers
- Do not use external devices without scanning them for computer viruses
- Ensure that the temperature in the room stays cool since there are many machines in the lab which can over heat easily.
- Dust can affect computers so ensure that all computers are always clean

Sub-topic 3: Servicing and maintenance of computer

Maintenance of computers

Computer servicing and maintenance **is process of maintaining the computer in good working conditions**

Computer cleaning involves physically cleaning the interior and exterior of a computer, including the removal of dust and debris from cooling fans, power supplies, and other hardware components. This should be done after certain period of time (weekly/monthly).

A computer needs to be maintained in order to keep working properly and in good shape and contributes to keeping computer troubles at bay.

Typical computer maintenance tasks include backing up your files, running antivirus software, installing software updates, using disk tools to keep your hard disk in good shape and physical cleaning of your equipment.

- **Back Up Your Files**. One of the most stressful experiences for a computer user is data loss. Most computers use a hard disk drive as the primary storage device. Hard disk drives can function for many years, but at some point, they will crash.

  One of the solutions is to create a backup of your files. You can burn a CD or DVD with your most critical files, copy your files to an external hard disk drive or use an online backup service. Whatever strategy you use, just make sure you create a backup copy of your files on a regular basis.

- **Use Antivirus Software**. Computer systems face a number of security threats. The most serious threats consist of viruses.

  A computer virus is a computer program that can cause damage to a computer's software, hardware or data. It is referred to as a "virus" because it has the

capability to replicate itself and hide inside other computer files.

The best way to deal with the threat of computer viruses is to use antivirus software. Antivirus software helps to protect a computer system from viruses and other harmful programs.

Antivirus software prevents viruses from getting into your computer system, scans your online activity to make sure you are not downloading infected files also helps to detect and remove viruses from your computer system if you get infected.

- **Use Disk Tools**. Disk tools include a range of different tools to manage hard disk drives and other storage devices. These are important because a hard disk drive failure can have disastrous consequences, including losing all your data. Keeping disks running securely and efficiently is an important part of overall computer maintenance.

  Some of the recommended disk tools you should use on a regular basis are disk cleaning and disk defragmentation.

- Do not download and install unknown software from Internet. This is the biggest mistake most of the PC users are doing. Some of this software can damage the Windows registry, which cause lot of errors.
- Install anti Spyware program to detect Spyware tools.
- Install a Personal Firewall. Most of the antivirus programs are bundled with Personal Firewalls these days. Personal firewall is a barrier between your PC and the outside world. This can protect your PC from hackers and Spyware tools.
- Uninstall unnecessary programs installed in your PC.
- Be very careful when you download music from the Internet. Always stick to one trustworthy web site.
- Delete temporary Internet files.
- Set-up your PC to Download and install “Windows Updates" automatically. Windows updates include Operating System patches for bugs and PC security related issues. These patches can reduce many unknown computer problems.

- Software update is also called a patch because it's 'patching' the software.
- **The top reasons computers slow down**
- We are often asked to investigate why a computer is running slowly and what can be done to make it faster. Diagnosing the reason a computer is running slowly requires checking all of these potential causes, since the symptom alone is not enough to differentiate or isolate the cause. This list is not comprehensive; there are some other unusual and rare causes that will make a computer run more slowly

1. Insufficient RAM to run all programs in memory without swapping to the hard drive.

   Solution: compare commit charge to physical RAM and add RAM memory.

2. Bad hard drive; disk errors creating delays. Solution: test and repair or replace the hard drive.
3. Low performance CPU. Solution: replace a Celeron CPU with a Pentium CPU for improved performance.
4. Overheating due to failed fan or excessive dust blocking heat sink. Solution: clean accumulated dust using compressed air.
5. Bad motherboard due to failed capacitors that is cracked, leaking or bulging. Solution: replace the motherboard or the system unit.
6. Memory leak; software bug causing a program to use increasing amounts of RAM until restarted. Solution: upgrade the software causing the excessive memory usage or restart more frequently.
7. Wrong video driver making the display run slowly. Solution: upgrade the video driver software in Windows device manager.
8. Low performance wireless connection due to 11mbps wireless B or distant antenna with a weak signal. Solution: upgrade wireless router or access point.
9. Too many add-ons or excessive toolbars in Internet Explorer or Windows startup.

   Solution: use MS config to remove startup programs, use add-on manager in IE7 and later to remove unused add-ons and toolbars.

10. Viruses and spyware stealing memory and processor performance. Solution: use Malware bytes and other scanning tools to identify and remove extraneous software.
11. Low performance hard drive with 2mb cache or 5400-rpm spindle motor: Solution: replace hard drive with faster 8mb cache and 7200-rpm spindle motor or SSD drive.

TOPIC 4: COMPUTER WORD PROCESSING

Introduction

Microsoft Word is the industry-standard word processing program used on most computers. With Word, you can create documents and complete a number of other functions related to word processing. This program carries with it several advantages that you can benefit from.

Advantages of Microsoft Word

- Availability: One of the advantages of using Microsoft Word is that it is available practically everywhere. Word comes standard on many PCs. You can typically find it on your work computer, computers at school and your home PC. This makes it easy to save documents on a flash drive, take them with you and work on them somewhere else. If you need to do some work, you can usually find a computer with Word on it.
- Integration with Office Programs: Another benefit of using Microsoft Word is that it easily integrates with other Microsoft Office programs. For example, if you have a spreadsheet that you created on Microsoft Excel, you can easily paste it into a Word document. You can work with programs such as PowerPoint as well. This makes it possible to complete a wide array of computing tasks without having to spend time converting documents or files so that they are usable on other programs.
- Instant Help: While you are creating a document, Word also helps you make sure that it is the best it can be. When you misspell a word, Microsoft Word will immediately underline it. You can then click on the word and get suggested spellings. If you type a sentence that has poor grammar, Word will underline the sentence for you. This allows you to change the document while you are still working on it.
- Navigation Pane: Microsoft Word offers an easy-to-use navigation pane at the top. This allows you to see visual representations of many of the functions that you might need. You can simply hold your mouse cursor over an icon to see exactly what it does. Then you can click on the buttons to initiate certain functions and tasks. Instead of having to scroll through multiple menus to find something, you can usually find what you need on the pane.
- Document Flexibility: Word lets you create simple word-processing documents like letters and reports and make them as basic or as jazzed-up as you wish -- you can add color, use clip art, write in a variety of fonts and sizes, and use tables, borders and bullet formatting. Word also offers templates to help you create numerous other documents, such as calendars and greeting cards. You can also save documents in a variety of formats, including a Web page.

Getting Familiar with Microsoft Word 2007 for Windows

Microsoft Word is a word processing software package. You can use it to type letters, reports, and other documents. It gives you the ability to use your home computer as well as your business computer for desktop publishing. This tutorial teaches Microsoft Word 2007 basics. Although this tutorial was created for the computer novice, because Microsoft Word 2007 is so different from previous versions of Microsoft Word, even experienced users may find it useful. This lesson will introduce you to the Word window. You use this window to interact with Word.

- The Microsoft Office Button
- The Quick Access Toolbar

- The Title Bar
- The Ribbon
- The Ruler
- The Text Area
- The Vertical and Horizontal Scroll Bars
- The Status Bar
- Understanding Document Views
- Click
- Understanding Nonprinting Characters
- Create Sample Data and Select Text
- Place the Cursor
- Execute Commands with Keyboard Shortcuts
- Start a New Paragraph
- Exit Word

Microsoft Word 2007 Basic Features

Lesson 1 familiarized you with the Microsoft Word window. You are now ready to learn how to create a Word document. This lesson covers typing, using the Backspace key, using the Delete key, inserting text, bolding, underlining, and italicizing.

- Type, Backspace, and Delete
- Insert and Overtype
- Bold, Italicize, and Underline
- Save a File and Close Word

More Basic Features

The features in Word 2007 can make your work easier, make your documents more attractive, and/or enable you to work more efficiently. This Microsoft Word lesson teaches you how to open a file, cut, copy, paste, use AutoText, use spell check, use Find and Replace, and change fonts. All of these features either make your work easier or make your document more attractive.

- Open a File
- Cut and Paste
- Copy and Paste
- Use the Clipboard
- Create AutoText
- Use Spell Check
- Find and Replace
- Change the Font Size
- Change the Font
- Save Your File

Formatting Paragraphs and Working with Styles

When you type information into Microsoft Word, each time you press the Enter key Word creates a new paragraph. You can format paragraphs. For example, you can indent the first line of a paragraph, you can set the amount of space that separates paragraphs, and you can align a paragraph left, right, center, or flush with both margins. Styles are a set of

formats you can quickly apply to a paragraph. For example, by applying a style, you can set the font, set the font size, and align a paragraph all at once. In this lesson, you will learn about the various formats you can apply to a paragraph and about styles.

- Open a Blank Document
- Add Sample Text
- Add Space Before or After Paragraphs
- Change Line Spacing
- Create a First-Line Indent
- Indent Paragraphs
- Align Paragraphs
- Create a Hanging Indent
- Choose a Style Set
- Apply a Style
- Change Style Sets

Adding Bullets and Numbers, Undoing and Redoing, Setting Page Layouts and Printing Documents

If you have lists of data, you may want to bullet or number them. When using Microsoft Word, bulleting and numbering are easy. The first part of this lesson teaches you to bullet and number. After you have completed your document, you may want to share it with others. One way to share your document is to print and distribute it. However, before you print you may want to add page numbers and tell Word such things as the page orientation, the paper size, and the margin setting you want to use. In this lesson you will learn how to layout and how to print your documents.

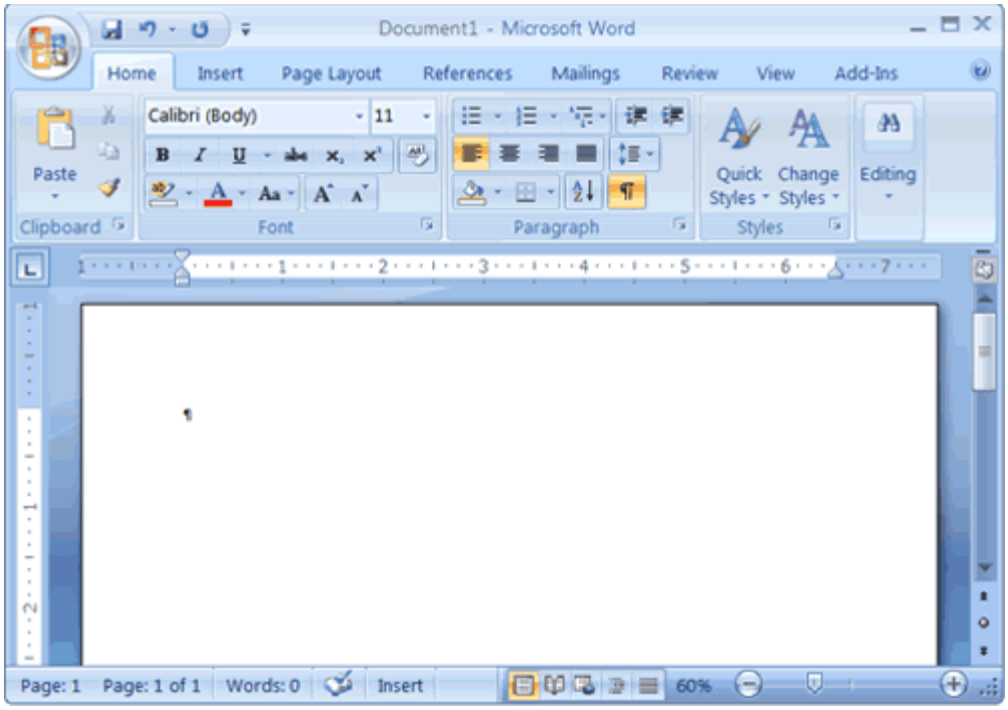
- Add Bullets and Numbers
- Undo and Redo
- Set the Orientation
- Set the Page Size
- Set the Margins
- Add Page Numbers
- Insert Page Breaks
- Preview and Print Documents

Microsoft Word Training

Lesson 1: Getting Familiar with Microsoft Word 2007 for Windows

Microsoft Word is a word processing software package. You can use it to type letters, reports, and other documents. This tutorial teaches Microsoft Word 2007 basics. Although this tutorial was created for the computer novice, because Microsoft Word 2007 is so different from previous versions of Microsoft Word, even experienced users may find it useful.

This lesson will introduce you to the Word window. You use this window to interact with Word. To begin this lesson, open Microsoft Word 2007. The Microsoft Word window appears and your screen looks similar to the one shown here.



Note: Your screen will probably not look exactly like the screen shown. In Word 2007, how a window displays depends on the size of your window, the size of your monitor, and the resolution to which your monitor is set. Resolution determines how much information your computer monitor can display. If you use a low resolution, less information fits on your screen, but the size of your text and images are larger. If you use a high resolution, more information fits on your screen, but the size of the text and images are smaller. Also, Word 2007, Windows Vista, and Windows XP have settings that allow you to change the color and style of your windows.

The Microsoft Office Button

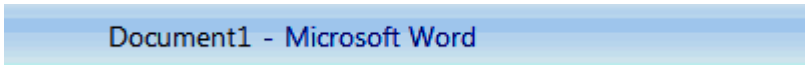
In the upper-left corner of the Word 2007 window is the Microsoft Office button. When you click the button, a menu appears. You can use the menu to create a new file, open an existing file, save a file, and perform many other tasks.

The Quick Access Toolbar

Next to the Microsoft Office button is the Quick Access toolbar. The Quick Access toolbar provides you with access to commands you frequently use. By default Save, Undo, and Redo appear on the Quick Access toolbar. You can use Save to save your file, Undo to rollback an action you have taken, and Redo to reapply an action you have rolled back.

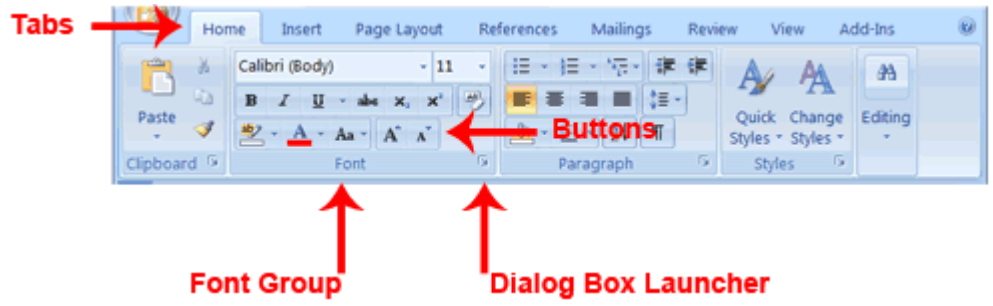
The Title Bar

Next to the Quick Access toolbar is the Title bar. The Title bar displays the title of the document on which you are currently working. Word names the first new document you open Document1. As you open additional new documents, Word names them sequentially. When you save your document, you assign the document a new name.



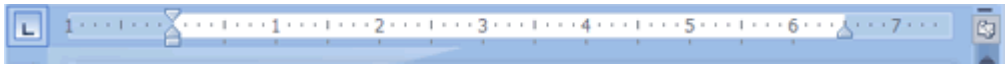
The Ribbon

You use commands to tell Microsoft Word what to do. In Microsoft Word 2007, you use the Ribbon to issue commands. The Ribbon is located near the top of the screen, below the Quick Access toolbar. At the top of the Ribbon are several tabs; clicking a tab displays several related command groups. Within each group are related command buttons. You click buttons to issue commands or to access menus and dialog boxes. You may also find a dialog box launcher in the bottom-right corner of a group. Clicking the dialog box launcher gives you access to additional commands via a dialog box.

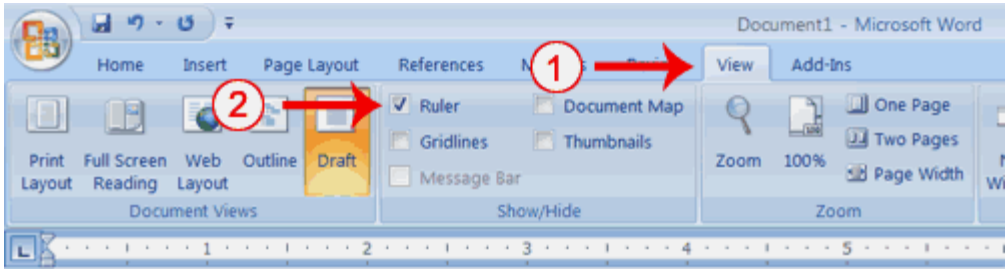


The Ruler

The ruler is found below the Ribbon.



You can use the ruler to change the format of your document quickly. If your ruler is not visible, follow the steps listed here:

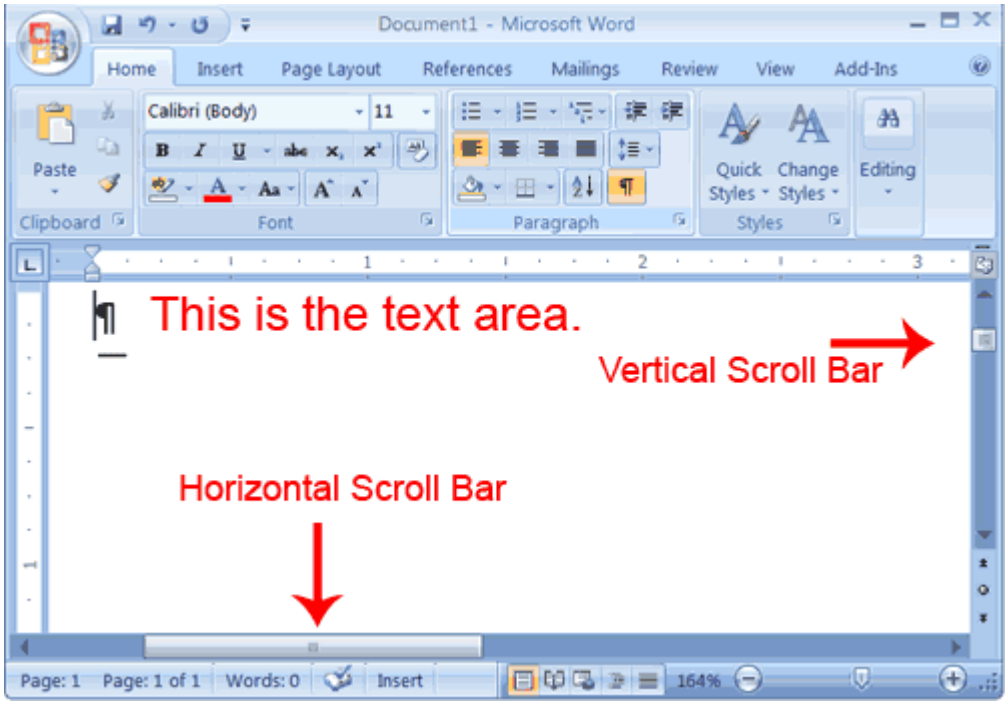


Click the View tab to choose it.

Click the check box next to Ruler in the Show/Hide group. The ruler appears below the Ribbon.

The Text Area

Just below the ruler is a large area called the text area. You type your document in the text area. The blinking vertical line in the upper-left corner of the text area is the cursor. It marks the insertion point. As you type, your text displays at the cursor location. The horizontal line next to the cursor marks the end of the document.

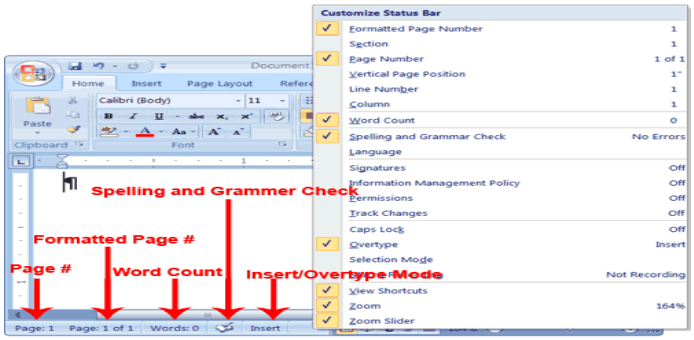


The Vertical and Horizontal and Vertical Scroll Bars

The vertical and horizontal scroll bars enable you to move up, down, and across your window simply by dragging the icon located on the scroll bar. The vertical scroll bar is located along the right side of the screen. The horizontal scroll bar is located just above the status bar. To move up and down your document, click and drag the vertical scroll bar up and down. To move back and forth across your document, click and drag the horizontal scroll bar back and forth. You won't see a horizontal scroll bar if the width of your document fits on your screen.

The Status Bar

The Status bar appears at the very bottom of your window and provides such information as the current page and the number of words in your document. You can change what displays on the Status bar by right-clicking on the Status bar and selecting the options you want from the Customize Status Bar menu. You click a menu item to select it. You click it again to deselect it. A check mark next to an item means it is selected.



Understanding Document Views

In Word 2007, you can display your document in one of five views: Draft, Web Layout, Print Layout, Full Screen Reading, or Online Layout.

Draft View

Draft view is the most frequently used view. You use Draft view to quickly edit your document.

Web Layout

Web Layout view enables you to see your document as it would appear in a browser such as Internet Explorer.

Print Layout

The Print Layout view shows the document as it will look when it is printed.

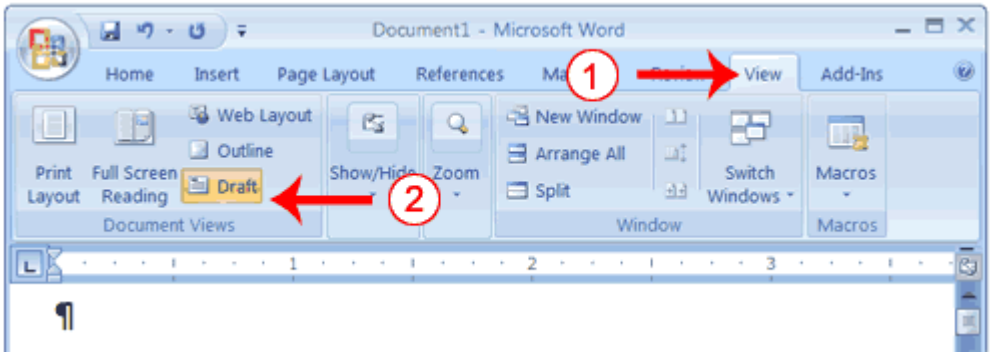
Reading Layout

Reading Layout view formats your screen to make reading your document more comfortable.

Outline View

Outline view displays the document in outline form. You can display headings without the text. If you move a heading, the accompanying text moves with it.

You should use Draft view for these lessons. Before moving ahead, make sure you are in Draft view:



Click the View tab.

Click Draft in the Document Views group. When the Draft option is selected it appears in a contrasting color.

Click

During the lessons that follow, you will be asked to "click" items and to choose tabs. When asked to click:

Point to the item.

Press your left mouse button once.

If you are asked to double-click an item:

Point to the item.

Quickly press your left mouse button twice.

If you are asked to right-click:

Point to the item.

Press your right mouse button.

If you are asked to choose a tab, click the tab.

TOPIC 5: COMPUTER HARDWARE

It's a general term used to describe all the various physical or tangible parts of a computer like monitor, printer, keyboard etc. Hardware is divided into four main components:

- Input devices/ units
- Output devices
- Storage devices
- Processing unit

(i) **Input units**. These are devices that feed the computer with data and information. They include; a keyboard, scanner, mouse, digital cameras, joy stick, smart cards, credit card, automated Teller Machine card (ATM card), light pen, magnetic ink character reader(MICR), optical mark reader (OCR), bar code readers, optical character readers, touch screen, digitizer among others.

OR

These are devices used in entering data and instructions into a computer. Note that, the input could be text (numbers, letters and formulae) images, sound etc.

Data can be inputted using the following input devices;

1. **Keyboard.** It's an input device that converts letters and other characters into electric signals readable by the processor. It has a type writer area, function keys, cursor movement keys and numerical keypad. It's a device which enables a computer user to communicate to the computer system. **Advantages of using the keyboard**

   - Entering data and instructions with keyboards is generally faster than pointing devices
   - Keyboards are more reliable and usually produce fewer errors than other input devices such as voice inputs

   There is no need to buy additional equipment since computers are normally supplied with keyboards

   Disadvantages of using a keyboard

   - ❖ It takes a lot of time to practice in order to type quickly and accurately

- ❖ Typing speed is still very slow when compared with computer speed

2. **Mouse**. This is a hand held pointing device which is used to point, select, move and draw object in the computer screen. Examples of mice include: codeless, touch pad (touch tone pad), mouse stick.

3. **Scanner**. Is a light sensing input device that converts printed texts and graphics into a digital form that can be further processed by the computer OR This is a device that is used to read graphical data or information into a computer e.g. logos, emblems, photos, pictures etc. scanners are usually used to capture existing documents in an electronic form for further processing or incorporating into other documents. Text and graphics can be scanned and images can be manipulated by changing the colors, the sharpness and contrast etc.

Types of scanners

- ➢ Hand scanners. These are used in scanning small objects e.g. logos, signatures, emblems, budges, thumb prints etc.
- ➢ Flatbed scanner. These are heavy scanners which are used for scanning commercial photos and pictures.

4. **Credit card**. It's a small plastic card that allows its holder to buy goods and services on credit and to pay at fixed intervals. It has a strip of magnetic tape fixed on it containing coded information which is usually the owner's code. The card is inserted into a slot where magnetic data may be picked. Details of the transaction are then recorded against the credit card number and the owner's account is credited with the transaction.

5. **Bar code reader.** Most items manufactured are labeled with a Universal Product Code (UPC), identifying the items .the label code is terms of bars with coded spacing and thickness. These bars contain information in codes that a computer can interpret. Most supermarkets today use this system and the codes can be seen on every item on stock. This enables fast pricing, identification and accurate stock tracking/taking. A bar code reader is a device used to read these codes and send request to central computer on which the database of the organization is stored, the central computer sends a response about the product details i.e. its price, name, manufactured date etc.

6. **Optical mark reader**. This is a device which can detect the presence or absence of a mark on a paper. Light is shown onto the paper and the reflected light is detected. This device is used for reading answers to questions in an exam or survey.

7. **The magnetic ink character reade**r. This is used to read characters written using magnetic ink. They are used in banks to read cheques and at points of sales in shops.

8. **The voice recognition devic**e. This is used to recognize words from a person and follow the instructions. An example of its use is in a computer which opens money safe, if the correct password is said.

9. **The joystick**. It's a device connected to a terminal with a control level that can be moved or titled in various directions for moving the cursor to any position on the screen. It's commonly used in computer graphics and in playing games.

10. **A light pen**. It consists of a stylus connected by a cable to the terminal that can sense the light from a position on the screen and convert it into an electrical signal transmitted to the computer. It can be used to move or delete images on the screen or to create new images**.**

11. **Touch screen**. With touch screen, users of computers just have to point on a particular item they want to select from the screen using their fingers. When a particular part is touched, the screen can sense that part and the item in that area will be selected.

12. **Digital cameras**. These take photographs like normal cameras do. The only difference is that digital cameras do not create an image on a film like ordinary cameras but instead the image is stored on the camera and after downloaded onto a computer for editing and printing.

(ii) OUTPUT UNITS

These are external hardware components that transfer information from the computer's central processing Unit (CPU) to the computer user in either soft or hardcopy format.

They include:

- Monitor (VDU) Printers
- The loud speakers
- The communication channel-links the computer through telephone lines
- Plotters projector

1. **The monitor**. This is a device which converts information generated by the computer into visual information. Monitors are either based on a cathode- ray tube (CRT) or LCD (liquid crystal Display)

Advantages of CRT monitors over LCD

- CRT has a wider view angle than the LCDs
- CRT monitors are resistant to harsh conditions like dusty conditions
- CRT monitors are cheaper than LCDs
- CRTs have a very fast response time
- CRTs are not affected by the problem of dead pixels as images are painted on the screen. Etc.

Disadvantages of CRT over LCDs

- CRTs consumes a lot of power than LCDs
- They consume a lot of space i.e. they are big in size
- They are not portable

Advantages of LCDs over CRT

- They use less power than CRTs
- They are portable
- They emit less radiations than CRTs

Disadvantages of LCDs over CRTs

- LCDs have a small view angle than the CRTs
- LCD monitors are not resistant to harsh conditions like dusty conditions
- LCD monitors are expensive than CRTs
- LCDs are affected by the problem of dead pixels as images are painted on the

screen. Etc.

2. **Printers**. These are devices which gives a hard copy of the soft copy of the data or information held in the computer. Printers are output devices that produce text and graphics on paper. They are connected by a cable to a PC through a special socket on the computer referred to as a printer port. **Types of printers:**

   They are basically two types of printers i.e**. impact** and **non-impact** printers.

   Impact printers are the ones which print by physically striking their print heads on the printing media like paper, cloth etc. e.g. Dot matrix which print using a set of pins on a print head, Daisy wheel which print using a wheel of characters etc. Their print heads press the paper with the ribbon to produce the printout.

   Non-impact printers are the ones which print by not physically striking their print heads on the printing media like paper, cloth etc. They use chemicals, laser or heat to produce the image. They give out high quality printouts. E.g. laser jet which uses toner contained in toner cartridges and ink jet which uses ink contained in ink cartridges.

(iii) STORAGE DEVICES (MEMORY)

These are devices that are used in computers to store data. Computer memory can be divided into three:

- Secondary storage devices
- Primary storage devices (also called main memory & cache)
- Read only memory (ROM)

a. **Secondary storage devices** or auxiliary storage devices are devices used to store information/data permanently even when power is switched off (its non-volatile)

   Examples

   Hard disks, Floppy diskettes, Compact disks, Digital versatile disks, Flash disks, Memory cards Etc.

   Types of secondary storage devices

   (i) Magnetic secondary storage devices

   (ii) Solid state secondary storage devices

(iii) Optical secondary storage devices

MAGNETIC SECONDARY STORAGE DEVICES

Magnetic tape: is a storage medium that consists of a thin tape with a coating of a fine magnetic material used for recording digital data.

Magnetic tapes generally transfer data a bit slower than hard drives; however magnetic tapes are cheaper and are more durable.

Floppy diskette: is secondary storage medium that can be used to store data in a permanent manner. It stores data in form of tracks and sectors.

But inserting a floppy disk into system we must use a **floppy disk drive.** The capacity of the floppy disk is **1.44MB.**

Zip disks: is a high capacity floppy disk drive that is slightly larger than a normal floppy disk. They can hold 100 or 250 MBs of data; they are durable and good for backing up data **Magnetic hard disk**: is the main and usually largest data storage device in a computer. A hard disk is generally the fastest in all secondary storage devices and has the large data storage capacity.

Advantages of magnetic storage devices

- Inexpensive storage
- There is direct access on any part of a drive
- There is very fast access to data
- Very large amounts of storage space

Disadvantages of magnetic storage devices

- Data can be altered by magnetic fields, dust and mechanical problems
- Gradually lose their charge over time i.e. there is data loss over time
- Hard disks eventually fail which stops the computer from working.
- Cannot transfer the disk to another computer easily

SOLID STATE SECONDARY STORAGE DEVICE

This is a data storage device based on electronic circuits with no moving parts. Solid state devices use a special type of memory called **flash memory**.

Flash memory is a type of **electronically Erasable Programmable Read Only**

memory. Flash memory is non-volatile but data stored in it can be erased or changed.

Examples of solid state storage devices

(i) Memory cards

(ii) Flash disks

(iii) Smart cards

Hard disk; This is a round pancake-shaped permanently sealed metallic magnetic device on which large amounts of data are stored and always linked or fitted inside a computer

Floppy disk; this is small portable plastic disk used to store data or information. It utilizes its magnetic properties to keep data or information.

Digital Versatile Disks (DVD's). They look exactly like CD's except that DVD's have got very big storage capacity than CD's. CD's have the capacity ranging from 500MB's to 700MB's but DVD's range from 1 GB to 20 GB's.

Zip drives. These are related to diskettes but they are bigger than diskettes in terms of size and storage capacity. They have storage capacity ranging from 100 MB to 2 GB's.

Compact Disks (D's) /Optical disks; they are categorized into

- **Compact Disk Read Only Memory (CD-ROM**). With these disks, you just read what is there but you cannot erase or write on them.
- **Compact Disk Recordable (CD-R).** This type can be written to but only once. This means that once you write on this disk, you can't erase to write new information or make changes to the existing one.
- **CD Re-writable (CD-W).** These disks can be written to as many times as you want. This means that after writing on this type of disk, you can erase that data and write on it again.
- **Punched card**. It's a rectangular card used to store data by the presence or absence of small holes that can be punched in specific locations on the card. These cards were used with first computers before disks were invented.

PRECAUTIONS MEASURES TAKEN IN KEEPING DISKETTES

- Do not fold, spindle or mutilate a disk.
- Do not place a diskette near a magnetic field such as near a radio speaker, on top of your system unit or near electric motor etc.
- Do not expose a diskette to direct sunlight for long periods.
- Keep a diskette away from intensive heat.
- Always keep it in its jacket so that the exposed surface is covered.
- Do not drop it on a hard surface e.g. on the floor.
- Do not drop water on the exposed surface of the diskette.
- Do not expose it on X-ray.
- Do not insert or remove it from its drive when the drive active light is on.
- Do not force it into its drive. It should slip in with little or no resistance.
- Do not write labels directly on it. Use a felt pen.

Differences between hard disk and floppy disk

Hard disk	floppy disk
Stores more information	stores less information
Metallic	plastic
Fixed	flexible
Reads information faster	it is slow
Exposed to less risks	exposed to more risks

b. **The primary memory.** This is a type of memory that stores data and instructions only when the computer is working. It's a temporary type of memory that can lose its contents when power to the computer system is turned off (volatile memory)

There are two types of primary storage:

- Random Access Memory (RAM)
- Cache memory

RAM Random Access Memory (the main memory of the computer); this is the working memory and main memory of the computer that temporarily store data

and programs that are being accessed by the computer.

The data and programs that are stored on RAM are volatile i.e. it be lost in case power in the machine is switched off.

Types of RAM:

- Static RAM (SRAM)
- Dynamic RAM (DRAM)

SRAM Static RAM uses a completely different technology. S-RAM retains stored information only as long as the power supply is on. Static RAM's are costlier and consume more power. They have higher speed than D-RAMs.

It's a form of RAM that is more expensive to produce, but is generally faster and requires less power than DRAM and, in modern computers, is often used as cache memory for the CPU.

DRAM; this is a form RAM which stores information for a very short time even when the power supply is on.

CHARACTERISTICS OF RAM

- Its volatile
- RAM is read and write memory
- It can be upgraded i.e. increased in size
- Stores data and instructions temporarily

Cache memory;Cache memory is a small-sized type of volatile computer memory that provides high-speed data access to a processor and stores frequently used computer programs, applications and data.

It is the fastest memory in a computer, and is typically integrated onto the motherboard and directly embedded in the processor

Read Only Memory – Non-volatile primary storage

This is another type of memory that holds information which was put there at the time of manufacturing. It can't be modified and additions can't be made. A computer has a set of in-built instructions it has to know what to do when turned on.

The instructions built into ROM are permanent.

The computer can read or follow instructions in ROM but can't change them or add to them. That is why the memory is called Read Only.

It's a stable memory i.e. it's not affected by power cut off. An example of ROM memory is the PC's ROM BIOS (Basic Input and Output System) chip. This ROM chip contains a set of instructions that the microprocessor uses when the PC is turned on or reset.

BASIC ROM TYPES:

PROM (Programmable Read only Memory)

PROM is read-only memory that can be modified only once by a user. The user buys a blank PROM and enters the desired contents using a PROM program. It can be programmed only once and is not erasable.

EPROM (Erasable and Programmable Read Only Memory)

The EPROM can be erased by exposing it to ultra-violet light for duration of up to 40 minutes. Usually, an EPROM eraser achieves this function. **EEPROM (Electrically Erasable and Programmable Read Only Memory)**

The EEPROM is programmed and erased electrically. It can be erased and reprogrammed about ten thousand times. Both erasing and programming take about 4 to 10 ms (millisecond).

CHARACTERISTICS OF ROM

- It keeps data and programs permanently
- Can't be upgraded
- Its non-volatile
- It only allows reading of data

DIFFERENCE BETWEEN RAM AND ROM

- RAM is volatile and ROM is non-volatile
- RAM is temporary and ROM is secondary

(iv) **PROCESSING DEVICE/ PROCESSOR**

This is the heart of the computer where the entire processing takes place. It

is sometimes referred to as the brain of the computer. It is the center of activities in the computer hence referred to as Central Processing Unit.

The microprocessor does the following;

- Carries out commands to make the hardware components perform action
- Processing data. This involves performing logical instructions such as comparing and performing mathematical instructions such as adding and subtracting.

A CPU comprises of the following parts;

- The arithmetic and logic unit (ALU): performs calculations and decisions
- The control unit: coordinates processing steps
- The registers (temporary storage): small storage area

The Arithmetic and Logic Unit (ALU): This is the component in the CPU, which handles all the arithmetic and logic operations of the computer system. It is actually the calculator of the computer system.

The control unit; this is a component of the CPU which governs all activities within the computer. It interprets instructions stored in the main memory and gives instructions to relevant parts of the computer system.

The control unit performs the four steps carried out by the machine cycle within the CPU for each machine language instruction. The machine cycle has got four steps which include;

- Fetching; this is a stage that involves retrieving an instruction from memory.
- Decoding; this translates the retrieved instruction into a series of computer commands.
- Executing; this executes/manipulates the computer commands
- Storing; this involves sending and writing the results of execution back to memory.

Processing terms includes; Multitasking, Multithreading, Time-sharing

- Multitasking; A processing activity that allows a user to run more than

one application at the same time

- Multithreading; A processing activity that is basically multitasking within a single application
- Time-sharing; A processing activity that allows more than one person to use a computer system at the same time.
- **The registers**; this is the component which stores instructions temporarily in the CPU while awaiting handling by the (ALU).

MEMORY MEASUREMENTS

Memory in computers is measured basing on the basic operations of a computer. A computer operates in the binary system of measurement. i.e. 0's and 1's

A bit is a value of either a 1 or 0 (on or off).

Byte**:** One byte is eight binary digits (bits), such as 1111001.

A Kilobyte is 1,024 bytes. The smallest file stored on a smartphone, tablet or PC is typically four kilobytes (4KB) in size.

A Megabyte is 1,048,576 bytes or 1,024 Kilobytes

A Gigabyte is 1,073,741,824 (2^{30}) bytes. 1,024 Megabytes or 1,048,576 Kilobytes.

A Terabyte is 1,099,511,627,776 (2^{40}) bytes, 1,024 Gigabytes, or 1,048,576 Megabytes.

Terabyte (TB): There are 1024GB in one terabyte (TB)

1000 bytes = 1 kilobyte

1000 kilobytes = 1MB.

1000MB = 1GB

1000GB = 1TB.

Note:

- Information in this memory can be changed, deleted, copied and read.

-This is the working memory and main memory of the computer.

However, RAM is a volatile memory i.e. in case the machine is turned off or power goes off without saving all the information in the memory is lost.

COMPUTER PERIPHERAL DEVICE INTERFACES

There are five different kinds of port in a system unit. The ports are:

- Serial Port
- Parallel Port
- Universal Serial Bus (USB) Port.
- Fire wire Port
- Special Purpose Ports

a. SERIAL PORT. A serial port is a socket on a computer used to connect a modem, data acquisition terminal or other serial devices via a slow-speed serial interface.

A serial port is used to connect a device to the system unit by transmitting data one bit at a time. Earlier PCs used the serial port for the mouse, and earlier Macintosh models used the serial port to attach a printer.

Today, the serial port is a legacy interface, having been superseded by the

USB bus; an example of a serial port is the COM (communication) port.

b. **PARALLEL PORT**; A parallel port is a socket on a computer used to connect a printer or other parallel devices via the computer's parallel interface. port, a parallel port is an interface that connects devices by transferring more than one bit at a time. Originally, parallel ports were developed alternative to the slower speed serial ports. Many printers connect to the system unit using a parallel port.

This parallel port can transfer eight bits of data (one byte) simultaneously through eight separate lines in a single cable. An example of a parallel port is the printer port.

c. USB PORT

A USB port is a socket on a computer or peripheral devices into which a USB cable is plugged in. A USB port, short for universal serial bus port, can connect up to 127 different peripherals together with a single connector.

It's used to connect all kinds of external devices, such as external hard drives, printers, mouse and scanner. It can transfer data to a speed of 12 megabits per second. USB ports began to appear on PCs in 1997, and Windows 98 was the first Windows to support it. Within a few years, the USB became popular for connecting nearly every external peripheral device. Now that it is replacing the serial and parallel ports on a PC, at least four USB ports are standard on every computer.

d. **SPECIAL PURPOSE PORTS**. There are three special purpose ports, which are MIDI port, SCSI port and IrDA port.

MIDI port; It is designed to connect the system unit to a musical instrument, such as an electronic keyboard.

SCSI port; It is a special high-speed parallel port used to attach peripheral devices such as disk drives and printers

IrDA port

TOPIC 6: COMPUTER SOFTWARE

Sub topic 1. Introduction to software

Software is the set of computer programs that provide instructions to computer hardware.

Software can also be described as a sequence of logical instructions stored in memory that a computer executes in the processing of data.

Program; This is a series of step-by-step instructs that provide solutions and tell the computer what to do. They are logical arranged set of programming statement.

Software is broadly divided into (**types of software**):

- **System software** and
- **Application software**

CHARACTERISTICS OF SOFTWARE

a) Correctness: the software should meet all the specifications stated by the customer.
b) Usability/learnability: the amount of effort or time required to learn how to use the software should be less.
c) Reliability: the software product should not fail while processing a task.
d) Efficiency: the software should make effective use of the storage space and execute commands as per the desired timing requirements.
e) Security. The software should not have negative effects on data it is processing or hardware on which it is installed.
f) Safety. The software should not be hazardous to the environment and life. g) Cost. It should be affordable in terms of cost.
g) Maintainability. Maintenance of the software should be easy for any kind of user.
h) Scalability. Software should be easy to upgrade for more functionality (or for more number of users).
i) Interoperability. This is the ability of software to change information with other applications e.g. exporting MS excel data to ms word.
j) Portability. The ability of software to perform same functions across different environments and platforms, e.g. same performance on dell, Acer and hp computers.

A. SYSTEM SOFTWARE

System software refers to programs designed to manage the operations of computers and avail computer resources to the users.

Types of System software:

- The operating system
- Software development tools (programming languages, compilers, interpreters
- The utilities (utility software)
- Data communication software

1. **Operating system.** These are programs that manage the computer resources. Op supervises and manages the different activities that take place in the computer like the way the software uses the hardware. The operating system ensures that the computer operates in a systematic reliable manner.
   a. **Types of operating system single programming operating system** this is operating system that can run one program at ago. E.g. MS-DOS (Microsoft Disk Operating System), CP/M (Control program for micro computers), XENIX, PC-DOS (Personal computer operating system).
   b. **Multiple programming operating systems;** this is can run a number of programs at the same time. e.g. UNIX, Zenix, Novel Netware, Ms-windows.

Functions of operating system

- Hardware management. It enables a computer to communicate with peripheral devices such as a printer, mouse etc. it controls all the input/output devices and the flow of data or information e.g. telling the monitor to display the results.
- Software management. It provides a mechanism for initiating processes that include programs such as Microsoft word, Microsoft Power Point.
- Data management. It manages files stored on a hard disk and other mass storage devices. It also performs file management tasks like renaming and deleting.
- It provides memory space to programs for execution.
- Coordinates the flow of data between the various application programs and users.
- Provides services for obtaining data.

- It helps in multi-programming.
- It enables booting a computer.
- Sometimes they have in-built system utilities like debuggers and defragmenters which help in the maintenance of disks.
- It helps in mediating between the computer user and the computer system in order to help the user to interact with the computer hardware to obtain results.
- It coordinates all activities in the various parts of the computer
- It alerts the user and reports errors
- It manages resources such as the CPU and memory.
- It manages multi-tasking (doing many tasks at once e.g. printing, inputting and processing) and multi-programming (a technique of having more than one program in the main/ primary storage which programs may be running or are being processed at the same time). For example, having a word document and excel spreadsheet open at the same time.
- Ensures automatic update of time and date on the computer
- It determines the interface of the desktop. Some operating systems are command based and thus require one to type in commands (e.g. DOS) while others use graphics / pictures (e.g. windows XP)
- Controls system security by maintaining the use of passwords. A password is a set of system before further access is permitted.

2. **Programming Languages**: These are coded instructions which are used when designing computer programs. Programming languages provide a medium used to write instructions that command computer hardware to perform particular tasks.

   These languages are grouped into two major categories:

- Low level languages (L.L.L)
- High level languages (H.L.L)

a. LOW LEVEL:

These are the languages, which the computer can understand. They are machine dependent and are very difficult for the programmer to understand. Examples include:

(i) **The machine language**: this is written in the binary code i.e. the digits 0s and 1s are used. It is also referred to as the first generation languages.

(ii) **The Assembly Language:** This language use letters to represent a group of

words instead of presenting a binary operation instruction to the computer as a set of ones and zeros. They use more English-like instructions "ADD". Each assembly language instruction is eventually translated into one machine language instruction. The computerized translation program is referred to as an **assembler (The plan language)**

b. **High Level Languages:** these are the languages which the programmer can easily understand. The computer can not immediately understand these languages. In these languages, instructions are used like wards and phrases and they are translated into a low-level language for computer to easily understand. High level languages are now referred to as **third- generation** languages.

Examples include;

- **BASIC: In full**: beginners all-purpose symbolic instruction code. This is used for training computer programmers.
- **COBOL: in** full: Common business Orientated Language. This is an internationally accepted high level programming language used for general commercial purposes.
- **FORTRAN:** In full: Formula Translation. It's a high level procedure orientated programming language used for mathematical and engineering purposes.
- **ALGOL;in** full: Algorithmic language. It's a high level procedure oriented programming language used for mathematical purposes.
- **PASCAL:** This was named after Pascal the mathematician. It's used for fast execution of mathematical problems.
- **C language:** This is a high level problem oriented programming language used for software development in a UNIX environment.
- **C++ language, LISP, APL, PROLOG, DBASE IV language etc.**

TYPES OF PROGRAM TRANSLATOR

- Assembler: this is a program for converting assembly language into machine code.
- Compiler: This computer program that translates a program or code written in a high level language into a low level language, usually machine language.

- Interpreter. A programming language processor that translates a program line by line (statement by statement) and carries out the specified actions in sequence

Software Development Tools

These are system programs that assist in the preparation of a program and translate into machine code for execution. Examples include; language translators, compilers, assemblers, editors, debug aids.

3. **Utility software.** These are system programs used to support, enhance or expand programs in a computer system. They can also be defined as software tools that are used to carry out organization and maintenance activities e.g. deleting of unwanted materials, deleting those programs which cause the computer to work abnormally etc. They are generally programs which perform tasks related to maintenance in your computer's health, hardware and data. They include:
   - File viewer, displays and copies the content of a file
   - Diagnostic utility. Compiles technical information about computer hardware and certain system software programs and prepares a report outlining any identified problems.
   - Disk scanner. Detects and corrects both physical and logical problems on a hard disk or removable drive, searches for and removes unwanted files. Physical problem is one with the media such as scratch on the surface of the disk.
   - Logical problem is one with the data such as a corrupted file allocation table (FAT)
   - Screen saver. Causes the monitors screen to display a moving image or blank screen if no keyboard or mouse activity occurs for specified time period.
   - Uninstaller. Removes an application as well as any associated entries in the system files.
   - **Backup up programs**. These ones let you protect your files by making copies of them.
   - **Data recovery programs**. These are used to restore data that has been physically damaged or corrupted.
   - **Data compression programs.** Reduces the size of the file
   - **Debuggers.** These are programs which correct errors in a computer program.
   - A bug is an error in a computer program and to debug means to correct errors in a program.

- **Defragmenters.** These are programs, which bring fragments of a file together for storage in one location in the computer memory.
- **Disk maintenance.** Disk maintenance utilities like Norton disk doctor, scandisk etc. These programs detect errors on a computer disk and fix them like checking for bad clusters on a hard disk or diskette and marking faulty ones as bad cluster.
- **A bug:** An error or defect in software or hardware that causes a program to malfunction. Often a bug is caused by conflicts in software when applications try to run in a wrong or unexpected way.
- **Debugging** is the process of locating and fixing or bypassing bug s (errors) in computer program code or the engineering of a hardware device.
- **Virus protection programs (Anti-virus programs).** This is anti-virus software which protects your system from viruses.

  A virus is a program that interferes with the normal running of a computer system. Anti-virus programs can be used to detect and remove viruses from your system and any other storage media. Examples of anti-viruses include; central point anti – virus, Mac fee, Norton anti-virus, Avast etc.

  Computer viruses: These are computer programs which silently replicate (reproduce) themselves on storage media without the computer user realizing it. A computer virus is a program designed to harm or cause harm on an infected computer. Its spreads through e-mail attachments, portable devices, websites containing malicious scripts and file downloads.

  A computer virus attaches itself to the host files and always activate whenever you open the infected files. The virus can replicate itself and then infect the other files on your computer causing more damage. Below is a list of different types of computer viruses and what they do.

TYPES OF COMPUTER VIRUSES

Sometimes virus hide in different places on the computer and in the process, perform various damages to the computer. They include;

a. **File virus**. This type of virus hides in program files, especially those files which have extension. EXE and COM.
b. **Boot sector viruses.** These viruses hide in the boot sector of a disk. This particular sector contains important information about the disk's logical setup.
c. **Partition sector viruses.** These hide in the primary sector of a hard disk. This

area is where programs which start a computer are stored. When a virus gets to this area, it at times changes the programs it finds there. In the end, this may cause a computer not to start.

d. **Macro Viruses.** These viruses infect the files created using some applications or programs that contain macros such as doc, pps, xls and mdb. They automatically infect the files with macros and also templates and documents that are contained in the file. They hide in documents shared through e-mail and networks.
Macro viruses include: Relax, bablas, Melissa.A, 097M/Y2K

e. **Memory Resident Viruses;** they usually fix themselves inside the computer memory. They get activated every time the OS runs and end up infecting other opened files. They hide in RAM. **Memory Resident Viruses Include:** CMJ, meve, randex, mrklunky

f. **Overwrite Viruses;** these types of viruses delete any information in a file they infect, leaving them partially or completely useless once they are infected. Once in the computer, they replace all the file content but the file size doesn't change.
Overwrite Viruses Include: Trj.Reboot, way, trivial.88.D

g. **Direct Action Viruses;** these viruses mainly replicate or take action once they are executed. These viruses are generally found in the hard disk's root directory, but they keep on changing location. **They include;** Vienna virus

h. **Directory Virus;** Also known as cluster virus or file system virus. They infect the computer's directory by changing the path indicating file location. They include; dir-2 virus

i. **Web Scripting Virus;** Most web pages include some complex codes in order to create an interactive and interesting content. Such a code is often exploited to cause certain undesirable actions. They mostly originate from the infected web pages or browsers. **Web Scripting Viruses Include:** JS.Fortnight – a virus that spreads via malicious emails.

j. **Multipartite Virus;** These type of viruses spread in many different ways. Their actions vary depending on the OS installed and presence of certain files. They tend to hide in the computer's memory but do not infect the hard disk.

k. **FAT Viruses;** These lardy viruses attack the file allocation table (FAT) which is the disc part used to store every information about the available space, location of files, unusable space etc. **FAT Viruses Include:** the link virus

l. **Companion Viruses;** These types of viruses infect files just like the direct

action and the resident types. Once inside the computer, they 'accompany' other existing files. **Companion Viruses Include:** Asimov.1539, stator and terrax.1069

m. **Polymorphic Virus;** they encode or encrypt themselves in a different way every time they infect your computer. They use different encryption and algorithms. This makes it difficult for the antivirus software to locate those using signature or string searches (since they are very different in each encryption). **Polymorphic Viruses Include:** Marburg, tuareg, Satan bug, elkern

n. **Worm;** this program is very similar to a virus and has the ability to self-replicate leading to negative effects on your computer. **Worm Viruses Include:** lovgate.F, sobig.D, trile. C, PSWBugbear.B, Mapson

o. **Trojans;** Trojans can illegally trace important login details of users online. For example E- Banking is very common among users, therefore, vulnerability of tracing your login details whenever your PC is working without any strong powerful antivirus installed. **Email Virus**

p. This is a virus spread via an email. Such a virus will hide in an email and when the recipient opens the mail.

q. **Browser Hijacker;** This virus can spread in many different ways including a voluntary download. If infects certain browser functions especially in form of re-directing the user automatically to certain sites. A good example of **Browser Hijackers Include** the cool web search

SOURCES OF COMPUTER VIRUSES

- Freeware and share. When infected software is installed on computer, it will automatically get infected.
- Contaminated diskettes
- Computer games especially. Games downloaded from the internet
- Updates of software distributed via networks

Symptoms of computer viruses

- Executable files changing size for no obvious reason.
- Program taking longer than usual load
- Unusual error messages occurring more frequently
- Programs and files disappearing mysteriously

- Access lights turning on for non referred devices
- Computer indicating that storage devices are full when there is still enough space

Ways of keeping computer virus programs out of your computer

- Getting aware of how computer viruses get into your computer for example some viruses are written to ride along with another computer program. When a computer user inserts a disk into a computer with an infected program on it, the virus is duplicated in the computer.
- If you are aware of how computer viruses are transmitted, you can avoid them by being careful about which program to use.
- Using special virus detection program. These programs analyze every program and every disk that is inserted into the computer to make sure that it is not caring any virus. If it does have a virus, detection program can be used to eliminate a found virus from a disk. Example of such programs include Norton anti-virus tool kit, Dr. Solomon's anti-virus tool kit etc.
- Avoid external disks especially diskettes as they may be carrying a virus. If you have an anti-virus program, first check your disks before using them.
- You have to be careful when downloading programs (freeware, shareware, computer games etc.) from the internet as some of the programs contain viruses.
- Perform a virus scan on your computer at least once a week and also other storage media like your diskettes, backup tapes etc.
- Always remember to update your anti-virus software. Every day, new viruses are created and the designers of these virus programs first look at the available anti - virus programs so that they can create a strange virus which can bypass those programs.

CHARACTERISTICS OF SYSTEM SOFTWARE

FUNCTIONS OF SYSTEM SOFTWARE

The three major functions of system software are allocating system resources, monitoring system activities, and disk and file management.

- **Allocating system resources:** The system resources are time, memory, input, and output. The time in the CPU is divided into time slices. The time slices is measured

in terms of milliseconds. Based on the priority of tasks the time slices are assigned. Memory is also managed by operating system. Disk space is the part of main memory. The data flow is controlled by operating system.

- **Monitoring system activities:** The system security and system performance is monitored by system software. System performance includes response time and CPU utilization. System security is a part of operating system. Multiple users can't access without the security code or password.
- **File and disk management:** The user needs to save, copy, delete, move and rename the files. The system software will handle those functions. Disk and file management is the technical task.

B. APPLICATION SOFTWARE.

These are programs designed to solve specific problems of the user.

Or programs designed to enable a user to accomplish a specific task (s)

Application software is divided into two: i.e. **off-shelf** and **Bespoke (custom-made) software/Tailor made** application software.

1. **Off-shelf application software;** these are already made programs bought 'off-the shelves' from a software shop or vendor.

   It can also be defined as software that is ready-made and available to lots of people. You usually pay a license fee to use it.

   Off- shelf application software can further be divided into **Horizontal market application**s (common applications you can find on every office computer) and **vertical market application**s also known as specialized application programs.

   Horizontal market software; these are software tools that are useful to almost any one in any job. These are programs you can find on almost every computer in every office.

   Vertical market (specialized applications). It consists of programs developed for a specific industry. Examples include Computer Aided Designs (CAD), Bakery recipes, Bridge analysis, airline ticketing, airplane wing structure, robots swivel control, electronic testing etc.

ADVANTAGES OFF-SHELF APPLICATION

- It is relatively cheap, especially when compared to custom written software
- It is easily available from most computer shops
- It will have been thoroughly tested so there won't be any serious problems or bugs
- There will be lots of user support i.e. books, user guides, online help and

discussion forums on the Internet

- **Lower training costs.** If it is a commonly used package, users and I.T. staff may already be familiar with it, saving on learning time and training costs. Or, there may be pre-existing training materials and courses that you can leverage.
- **More functionality.** Off-the-shelf software often has more functionality, because the developers try to meet the requirements of as many users as possible. (There may even be functionality you didn't realize you need!)
- **Upgrades.** The vendor will continue to develop the software, so you will likely get upgrades for free or at a reduced cost, whereas in bespoke software you don't get anything new unless you pay for it to be built.

DISADVANTAGES OFF-SHELF INCLUDES:

- Limited to perform what they were designed for
- Can easily be pirated
- Vulnerable to virus
- They make you to pay for many applications when you are to use a few.
- **Compromise.** You may have to compromise on your requirements – it is unlikely you will find ready-made software that does everything you need it to, exactly how you want it to.
- **May be overly complicated.** The software may include functionality that you don't need, as it is trying to meet the different requirements of a number of users. This can make it more difficult to learn and use.
- **You are not in control.** The vendor's plans for the future may not always fit with your own. As a single customer amongst many, you may not be able to get the features you want implemented.

Examples of application software include;

- Microsoft word Microsoft excel Microsoft PowerPoint Microsoft access Microsoft publisher etc.

CATEGORIES OF APPLICATION SOFTWARE:

- **Spreadsheets** used for organization and analysis of data in tabular form.
- **Word-processors** used to produce text documents that are professionally laid out.
- **Presentation software** used for creating presentations to show to customers or staff
- **Databases** used for keeping customer records, sales records, appointments

system

- **Desktop publishing packages** used for creating leaflets, posters, business cards
- **Graphics packages** for manipulating images that can be used at home, school or a business
- **Web design application** used for creating personal or business web sites
- **Communication software** among others.
- **Computer-aided design** (**CAD**) is the use of computer systems to assist in the creation, modification, analysis, or optimization of a design. CAD software is used to increase the productivity of the designer, improve the quality of design, improve communications through documentation, and to create a database for manufacturing.

2. **Bespoke (custom-made) software/Tailor made application software;** bespoke software is written especially for you, to meet your specific business requirements. If very specialized software is needed, a company may decide to write or order its own software. This software is called custom software. This software is developed by computer specialists or programmers. Examples may include; report making software, loan portfolio software for Cairo bank, programming in D-base dealing in hotel operations etc.

THE ADVANTAGES OF BESPOKE (CUSTOM-MADE) SOFTWARE ARE:

a. **Tailored to you.** The software is developed and built to meet your specific requirements, ensuring that you get software that works exactly how you need it to and delivers the results you want.
b. **More flexible.** A bespoke system can evolve over time to match your changing requirements.
c. **No per-user fees.** If you own the software, you won't have to extra per-user fees as your business grows.
d. **Not tied in.** You own the intellectual property, so you are not tied to a specific vendor that could potentially disappear at any time.
e. **Competitive advantage.** As your competitors won't have the same software, it could give you a competitive edge. An effective software package can make a company work more efficiently, improve their performance and have a positive impact on customer satisfaction levels.

The disadvantages are:

- **Higher initial costs.** It will cost more at the beginning, as you have to pay the development costs.
- **Takes longer.** Depending on the size and complexity of the software, it may take months or even years to develop.

SOFTWARE USER INTERFACE

This is the visual part of a computer application or OS through which a user interacts with a computer or software.

GRAPHICAL USER INTERFACE (GUI)

Is a type of interface that allows a user to use menus and visual images such as icons, buttons and other graphical objects to issue commands?

ADVANTAGES OF GUI

- It is user friendly because it is easy to learn and work with.
- There is no need to type and memories any command language.
- The interface is similar for any application
- GUI has a colored screen with icons each representing a program which is appealing to the user.
- It has help documentation.

DISADVANTAGES OF GUI

- They need significantly more memory (RAM) and processing power to run than other interface types
- It also occupies more disk space to hold all files for different functions.
- It difficult to automate functions for expert users.
- They can be irritating to experienced users when simple tasks require a number of operations

COMMAND LINE INTERFACE (CLI)

This is a text-based interface that is used to operate software by entering commands.

Advantages f (CLI)

- It uses the fewest system resources in terms of memory and processing power.
- It is faster for expert users because they can quickly access commands.
- Many commands can be grouped together as batch files so that repetitive tasks can

be automated

DISADVANTAGES

- It is difficult to use because some commands are hard to memorize
- Text editing can be strict and tiresome because commands have t be typed precisely. If there is a spelling error the command will fail.
- It is time consuming because if you miss-type an instruction, it is often necessary to start from scratch again.
- For efficient use, it requires the user to learn complex commands.

Comparison between GUI and CLI

TOPIC 7: ELECTRONIC SPREADSHEETS 1

TOPIC 8: INTERNET AND WORLD WIDE WEB

THE INTERNET: It's the global interconnection of computers to share information and data.

Internet is an arrangement of connected computers, which lets the computer users all over the globe exchange data.

Requirements for Connecting to the Internet

- A computer or PDA or cell phone
- An account with an ISP (Internet Service Provider)
- A modem (**mo**dulator/**dem**odulator) for dial-up services or a NIC (Network Interface Card) for DSL/Cable services

Connection Types

- Broadband Services. This is a high speed internet connection method that is provided through either a cable or telephone companies.
- WAN; LAN (Local Area Network). A network of computers that are in the same physical location, such as home or building. Usually connected using Ethernet. A standard on how computers communicate over a shared media (cable)
- WLAN (Wireless LAN)
- Wi-Fi (Wireless Fidelity). A wireless technology that connects computers without cables
- Access Point (AP). A device (base station) that connects wireless devices together. Usually connected to a wired-network
- ESSID (Extended Service Set ID) A "name" for the AP, e.g. mobile net
- Hotspots. These are sites that offer internet access over a wireless local area network by use of a router that connects to an ISP
- Dial-up Services. This method requires users to link their phone lines to a computer in order to access the internet
- Modem (**Mo**dulator/**dem**odulator) a device that converts analog signal to digital (modulation) and vice versa (demodulation).
- ISDN (Integrated Services Digital Network). This allows users to send data, voice and audio content over digital telephone lines. The installation of ISDN adapters require at both ends of transmission an ISP.

- xDSL (Digital Subscriber Line). A technology that provides digital data transmission over unused frequencies on traditional telephone lines.
- Cable. A technology that provides digital data transmission over cable TV infrastructure
- Satellite. A technology that provide digital data transmission over satellites. Need a satellite dish

ADVANTAGES OF THE INTERNET:

- Communication: By sending an e-mail, we can contact a person who is not physically present thousand miles away within the fraction of a second's time.
- E-commerce is the idea that is implemented for any form of business transactions that entails transmission of data from one corner of the world to another. E-commerce has become a fantastic option through which you can shop anything.
- Online Chat: There are many 'chat rooms' on the web.
- Downloading Software: This is one of the most happening and fun things to do via the Internet.
- Online learning. It facilitates long distance learning.
- Entertainment. A wide variety of entertainment including video games, music, movies, chat room, news and others can be accessed through the Internet.
- The biggest benefit offered by the Internet is information. It functions as a valuable resource of information. You can find any type of information on any subject with the help of the search engines like Yahoo and Google.
- Formation of communities. Internet helps in formation of communities or forums. Here a number of people can participate in different types of debates and discussions express their views and gather valuable knowledge.
- A variety of other advantages offered via Internet, include: job searching, online banking, buying movie tickets, hotel reservations and consultation services etc.

DISADVANTAGES OF THE INTERNET:

- Pornography: This is a very serious issue concerning the Internet, especially when it comes to young children.
- Spamming: This refers to sending unsolicited e-mails in bulk, which serve no purpose.
- Virus threat. Virus is a program that interrupts the usual operation of your personal computer system. PCs linked to the Internet have high probability of virus attacks

and as a result of this your hard disk can crash, giving you a lot of trouble.

- Theft of personal details while using the Internet, there is high probability that your personal details like name, address and credit card number may be accessed by con artists and used for fraudulent purposes.
- Some people are getting addicted to the internet and thus causing problems with their interaction of friends and loved ones
- It provides a lot of wrong information. This is because any one can post anything and much of it is garbage.

Factors that determine internet speed.

- Internet traffic; the server speed of the site you are visiting determines the speed of the internet.
- Device hardware; your computer's resources like speed, memory etc. also determine the internet speed i.e. if they are inadequate, the speed will be low.
- Viruses and malware; these consume significant resources like memory and adversely affect internet speed.
- Number of applications running; multiple programs using internet like downloading music with ITUNES and surfing the web using Firefox will reduce the overall speed.
- Number of devices connected; multiple laptops, tablets, smart phones reduce the overall speed of each device on the internet.
- **Internet service provider** (ISP). A company that provides internet access to individuals and business. Examples; Info com, Mai web, communication companies like MTN, AIRTEL, AFRICELL etc.

  Services provided by ISP include; internet access, Domain name registration, E-mail accounts, web hosting, IP addresses and ranges.

  Factors to consider when selecting an ISP
- Price; one should select an ISP whose price is friendly.
- Technical support; be sure the ISP you select provides technical support that meets your organization's requirements or that can offer help incase things go wrong.
- Viability; when selecting an ISP, do some checking to see how long the company has been in existence, track of records and whether or not they received an award.
- Performance; whether you are paying for a high speed connection or just using dial up, you should check the ISP's track records for such things as uptime and overall

throughout.

INTERNET COMMUNICATION SERVICES

a. Email Services; **Electronic mail** (or **e-mail**) is an Internet service that allows those people who have an e-mail address (accounts) to send and receive electronic letters.

Advantages of email:

- ☑ **Cost** .Email is cheap: businesses can save large amounts of money using e-mail, in lieu of long-distance phone calls and postal deliveries.
- ☑ **Time** .Email will reach its destination across the world in a few seconds as opposed to days or even weeks with the postal service.
- ☑ Convenient .Email doesn't worry about crossing time zones or that colleagues are not in their offices to take telephone calls.
- ☑ Email can be sent to groups of people at the same time. This facilitates collaborative working and efficient dissemination of information.
- ☑ Doesn't use any paper (good for the environment).
- ☑ Can attach large documents and other files with a click of a button (and without using up resources like paper).
- ☑ Unlikely to be lost
- ☑ Faster to arrive
- ☑ Allows sending messages to several people at a time
- ☑ Cheaper in terms of costs incurred
- ☑ Less prone to illegal access
- ☑ Allows sending multimedia format document
- ☑ Several documents can be sent at once

Disadvantages of emails:

- ☑ User has to open email website or email program to read the message. If you do not login, unread messages can remain unread forever.
- ☑ Socially, writing a letter and talking over a phone is thought to bring you closer to the recipient compared to writing an email through a computer.
- ☑ A lot of unwanted emails from spammers can fill your email inbox and important emails may not get delivered.
- ☑ Email attachments can bring virus into your computer if not scanned by the

network or virus program on your computer.

- ☑ Emails cannot really be used for official business documents.
- ☑ Less hand-writing practice.
- ☑ Can be bad for your eyes if you spend too long sending e-mails on your computer.
- ☑ Messages may be misinterpreted easily.

Components of an e-mail

- ❖ **Address or to;** this is where the address of the person whom you are sending the message must be typed. E.g. siraji1987@learnonline.ac.ug to mean the massage is for siraji belonging to learn online which is an academic institution (ac) of Uganda (Ug)
- ❖ **The subject;** this is where you type subject **or theme of your document e.g. Inquiry,** Application to someone.
- ❖ **CC**; Carbon copy: here you type the addresses of those to whom you are sending carbon copies. They can be as many addresses for cc as you wish only are separated by commas e.g. Ronnie@yahoo.com,opio@goodwillenc.co.ug, siraji3rk@yahoo.com.
- ❖ **BCC;** Blind carbon copies: here you type the addresses as in cc, but the recipients will not know whether the other has received the copy.

Other internet communication services/tools

b. **Instant messaging**; this type of online chat which offers real time text transmission over the internet.

c. **Video conferencing**; this is a technology that allows users in different locations to hold face-to-face meetings on the internet. It involves transmission of audio and video data.

Equipment for video conferencing

- ❖ Computers, web cam, a microphone, Skype, speakers, high speed internet, video conferencing software

Advantages of video conferencing

- ✓ It can take place without leaving the office.
- ✓ It minimizes travel costs

- ✓ Meetings can be called instantly
- ✓ Delegates can still attend the meeting even if they are physically unable
- ✓ It saves time
- ✓ Increases productivity by sharing of data.

Disadvantages

- # Confidential documents that need to be viewed and signed in person may not be used.
- # It is more expensive
- # It is limited to certain number of participants
- # Stability of connection requires complex technology

d. **Chat room**; this is a software application in which participants can engage in real time discussions about a specific topic with one another.

e. **News group**. This is an internet based discussion about a particular topic. It ranges from transport, cars, investments etc.

Cloud computing; in cloud computing a type of Internet-based computing," where different services — such as servers, storage and applications — are delivered to an organization's computers and devices through the Internet. Or the practice of using a network of remote servers hosted on the internet to store and manages resources. Examples include; e-mail communication, online storage such as Google drive, Drop box, web hosting services etc.

f. **Web browser;** is a software tool or program that allows you to navigate through the web. Or its application software that allows users to access/connect to the internet or it's a tool that allows you to view web pages and interact on the internet. Examples of web browsers include: Google Chrome, Mozilla Firefox, Internet Explorer, Opera, and Safari, Konqueror, Flock , etc.

g. **Search engine; It's** a program or web site that can be used to search for keywords on web pages throughout the World Wide Web.

A **web search engine** is a type of website that helps computer user find specific information on the Internet. Search engines include: Google, Yahoo!, Ask.com, Forestle, Bing and Alta Vista. Searches for information from the Web

h. **Website;** Web site is the location of a web domain name in a computer

somewhere on the internet.

Types of Websites

Static-Content; in static Websites, the information does not change, and the same information is displayed to all visitors.

Mostly coded in HTML so easier to build. Most commonly used for simple sites.

Updating is difficult.

Cannot do complex tasks, such as providing user interactivity.

Dynamic-Content: Dynamic website pages are able to accept input data (fill-in forms) and store that information in a database on the server, allowing a visitor to create a user profile and personalized experience.

In Dynamic Websites, the information may change at any given time and according to the visitor. Mostly built in scripting languages like JavaScript, and can be more difficult to build.

Used for large sites with a lot of content, sites that need extensive updates, use real time services (e.g. online stores), and/or require automatic changes (e.g. blogs).

Updating is easy.

Can do complex tasks, allowing for user interactivity and providing customized, personalized information

Personal Websites; A platform for individuals to provide information about themselves, promote themselves, create an online CV and/or portfolio, keep in touch with family and friends, share photos and videos, expand hobbies and interests, and express thoughts and ideas.

Commercial/Business Websites; A platform for companies or organizations to provide information about themselves, market or sell their products and/or services, and provide customer support

Informative Websites; these are dedicated to providing information. They may include news websites, online encyclopedias, educational websites, and websites providing topic-specific information like sports data, medical information, weather reports, stock market quotes and analysis, and TV guides.

Search Engines/Directories

These are search engines index material on the web that automatically responds to a

search query with links to relevant websites.

Directories list businesses by different categories and/or locations.

Wiki

A wiki is a specialized form of content-managed web site designed to support the easy collaborative creation of web pages by groups of users.

Wikis differ from blogs and other cms options in that wikis allow all users to change the content of the wiki pages, not just to post comments about the content. Examples of wiki are Wikipedia; online encyclopedia can be publicly accessible and edited by any user.

Blogs; Web logs, or blogs, are the most popular, inexpensive, and widespread form of web content management. Blog software such as Blogger, Roller, or Word Press allows nontechnical users to combine text, graphics, and digital media files easily into interactive web pages.

Blog – online journal used to express ideas/opinions

E-Commerce website – platform to sell products online

Forum – promotes discussions among people with mutual interests

Media-Sharing Website – where people can share pictures, videos, music, etc.

Review Websites – where people can write and/or view reviews of products, services, etc.

Social Networking Website – where people can meet, interacts and share multi-media.

Webmail – provides e-mail services

The **World Wide Web;** (Abbreviated as **WWW** commonly known as **the web**) is a system of interlinked hypertext documents accessed via the Internet. Or it's a vast collection of linked documents held on computers all over the world and is accessible via the internet.

Netiquettes; Refers to the do's and don'ts of online communication or rules and regulations governing online communication

Here are some of the of Netiquette

- Keep messages brief and use proper grammar and spellings
- Never read someone's private email
- Respect other people's privacy
- Know where you are in cyberspace. Understand the group of people you are

interacting with. When you join a new group, first understand its likes and dislikes before giving your full contribution

- Post only acceptable information that has no harm to the public
- Minimize use of uppercase in text when sending messages
- Be forgiving of other's people's mistakes like spelling error, a stupid question or unnecessary long answers because experts on internet were once beginners.
- Respect other people's time and bandwidth. Ensure that time and bandwidth people spend reading your postings is not wasted. Send a well prepared message and ensure that it's sent to right recipient.
- Make yourself look good online
- Avoid impersonation
- Be ethical and aim at acting within the laws of society and cyberspace
- Don't spam. That is, don't repeatedly post the same advertisement for products or services. Most sites have strict and specific rules about who is allowed to post ads and what kind of ads they are.
- Remember that your posts are public. They can be read by your partner, your children, your parents, or your employer.
- Do not post copyrighted material to which you do not own the rights.
- Treat others as you would like to be treated.

Internet and World Wide Web terms

- **Web site** is the location of a web domain name in a computer somewhere on the internet.
- **Web page** is a document on the web site. A web is composed of a web page or collection of related web pages.

  A web page is a document on the www that can include text, pictures, sound, and video.
- **Home page.** This is the first page you see at a web site, it acts like a title page of a book. It identifies the web site and contains links to other pages at the site.
- **Browsing**. With internet, it means searching for particular/ specific items.
- **Surfing means** moving from place to place on the internet searching for topics of interest.
- **Site name**: is the name of a web site.
- **Web pages**: contain formatted text, graphics, sound, animation and video

allowing point and click.

A webpage is a document, typically written in plain text interspersed with formatting instructions of Hypertext Mark-up Language (HTML, XHTML).

- **Telnet**: a terminal emulation protocol that allows a user to log onto a remote device.
- **FTP** (file transfer protocol) is an internet standard that allows users to upload and download files with other computers.
- **TCP/IP** is a set of protocols or rules that have been developed to allow computers to share resources across a network.

  TCP/IP manages the transmission of data by breaking it up into packets. The protocol defines how to break the message into packets, providing routing information for massage delivery, reassemble the message at the receiving end.
- **Hyperlink:** colored and underlined text or graphic that you click to go to a file, a location in a file, an HTML page on the www.
- Website is an electronic page that has links with other pages and contains information.

  Websites are the places where the information is stored in internet.
- **Web site address**: is a unique name given to the web site to communicate and collect the information.
- Web browser is a tool (piece of software) that allows you to view and interact on the internet. Internet explorer, Netscape, Mozilla Fire fox, Opera, Apple's Safari, and Google Chrome etc. are web browsers.
- Transmission control protocol/internet protocol TCP/IP. It's a set of protocols or rules that have been developed to allow computers to share resources across a network
- Webmaster: is the person responsible for developing web pages and maintaining a website.
- URL is an address that uniquely identifies a location on the internet. A URL for a www site is preceded with http://Examples of URL. http//unebuganda.co.ug
- HTML (Hypertext Mark-Up Language) is a set of formatting codes used to create hypertext or www based text files.
- Hyperlink. Coloured and underlined text or a graphic that you click to go to a file allocation in a file,

Computing; The process of utilizing computer technology to complete a task. **Or** the use of a computer to process data or perform calculations.

Green computing; also called **green** technology, is the environmentally responsible use of **computers** and related resources.

Green computing is the practice of using computers and other resources efficiently.

ADVANTAGES OF GREEN COMPUTING

- Reduced energy usage from green computing techniques translates into lower carbon dioxide emissions, stemming from a reduction in the fossil fuel used in power plants and transportation.
- Conserving resources means less energy is required to produce, use, and dispose of products.
- Saving energy and resources saves money.
- Green computing even includes changing government policy to encourage recycling and lowering energy use by individuals and businesses.
- Reduce the risk existing in the laptops such as chemical known to cause cancer, nerve damage and immune reactions in humans.

Disadvantages of green computing

- Green computing could actually be quite costly.
- Some computers that are green may be considerably underpowered.
- Rapid technology change

Cloud computing; Cloud computing a type of Internet-based computing," where different services — such as servers, storage and applications — are delivered to an organization's computers and devices through the Internet.

Cloud computing is typically defined as a type of computing that relies on sharing computing resources rather than having local servers or personal devices to handle applications.

This is the practice of using a network of remote servers hosted on the internet to store and manage resources. Examples include; e-mail communication, online storage such as Google drive, Drop box, web hosting services etc.

Advantages of cloud computing

Its services are flexible. You can easily scale up or down depending on your

requirements

Automatic software updates. The fact that cloud services are online, it's easy and convenient to update software centrally.

It cuts out the high cost of hardware purchase, storage and maintenance.

Increased collaboration; once people can access, edit and share documents anytime from anywhere, they are able to do more together and do it better convenience with cloud computing and availability of internet, you can work from anywhere.

Disadvantages of Cloud Computing

- Security and privacy in cloud computing is difficult to monitor.
- Cloud applications maybe expensive
- Customers have no control to the backend infrastructure of the cloud services.
- Service outage. The fact that cloud services are internet based, no one is free from service outage since access depends on internet connection.

TOPIC 9: COMPUTER WORD PROCESSING II

TOPIC 10: ELECTRONIC PRESENTATION

TOPIC 11: DATA COMMUNICATION AND NETWORKING

Data communication refers to the transmission of digital data between two or more connected computing devices

COMPONENTS OF DATA COMMUNICATION

1. **Message;** this is data/information to be communicated. This can be text, numbers, audio or video or any combination of these types
2. **Sender-encoder.** A sender is a device that sends the data message. This can be a computer, workstation, telephone handset, video camera or mobile phone.
3. **Medium;** the conduits/channels/media are the physical paths that telecommunications signals use to move from place to place. The various types of conduits of data include cables, fiber optics, satellite, and cellular.
4. **Receiver-decoder;** a device that receives the messages. It is a computer, workstation, telephone handset, television set or mobile phone.
5. **Protocol;** is a setoff rules and procedures that govern data communication.
6. **Feedback.** Feedback can be an oral or a written message, an action or simply silence.

In data communication four basic terms are frequently used. They are

Data: A collection of facts in raw forms that become information after processing.

Signals: Electric or electromagnetic encoding of data.

Signaling: Propagation of signals across a communication medium.

Transmission: Communication of data achieved by the processing of signals.

Data communication tools

These are devices that allow the user to send and receive messages. These can be electronic or manual. Examples of electronic communication tools include; computers, mobile phones and internet etc.

Manual communication tools include; manual drums, bells and messengers.

Difference between manual and electronic communication tools are:

Manual data communication	Electronic data communication
Slow	Faster
Does not support sharing	Support sharing
Requires less skill to operate	Ire quires literacy skills to use
Expensive to exchange information	Cheap to exchange information
Communication tools are cheap	Communication tools are expensive

Electronic data communication services

- Voice mail
- Global positioning system
- Faxing
- Intranet
- Email
- Extranet
- Instant messaging
- Skype
- Chart rooms
- Short message service
- Video conferencing
- Social networks like twitter, Facebook etc.

Data Transmission Modes; There are three ways for transmitting data from one point to another.

Simplex: is a mode of transmission where data flows in only one direction between the two communicating devices e.g. broadcast on radio, TV and transmission between keyboard and the monitor, fire alarms.

Half-duplex: is a mode of transmission where data signals can flow in both directions but not at the same time. E.g. walkie talkie communication well known as radio calls.

Full-duplex: is a mode of data transmission where data signals can flow in both directions at the same time. E.g. telephone communication.

Use of full-duplex line improves the efficiency as the line turn-around time

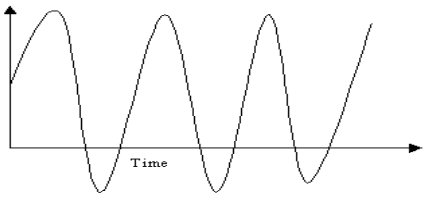
required in half-duplex arrangement is eliminated. Example of this mode of transmission is the telephone line.

Digital and Analog Transmission; Data is transmitted from one point to another point by means of electrical signals that may be in digital and analog form. In analog signal, the transmission power varies over a continuous range with respect to sound, light and radio waves. On the other hand a digital signal may assume only discrete set of values within a given range. Examples are computer and computer related equipment. Analog signal is measured in Volts and its frequency in Hertz (Hz).

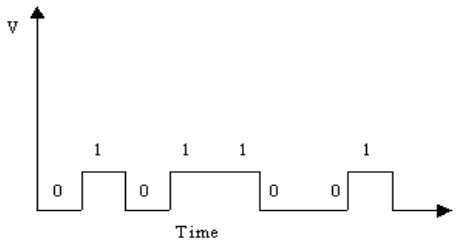
A digital signal is a sequence of voltage represented in binary form.

When digital data are to be sent over an analog form, the digital signal must be converted to analog form. So the technique by which a digital signal is converted to analog form is known as modulation. And the reverse process, that is the conversion of analog signal to its digital form, is known as demodulation. The device, which converts digital signal into analog, and the reverse, is known as modem.

Analog Signal



Digital signal



Asynchronous and Synchronous Transmission

Data transmission through a medium can be either **asynchronous** or **synchronous**. In asynchronous transmission, data is transmitted character by character as you go on typing on a keyboard. Hence there is an irregular gap between characters. However, it is cheaper to implement, as you do not have to save the data before sending. On the other hand, in the synchronous mode, the saved data is transmitted

block by block. Each block can contain many characters. Synchronous transmission is well suited for remote communication between a computer and related devices like card reader and printers

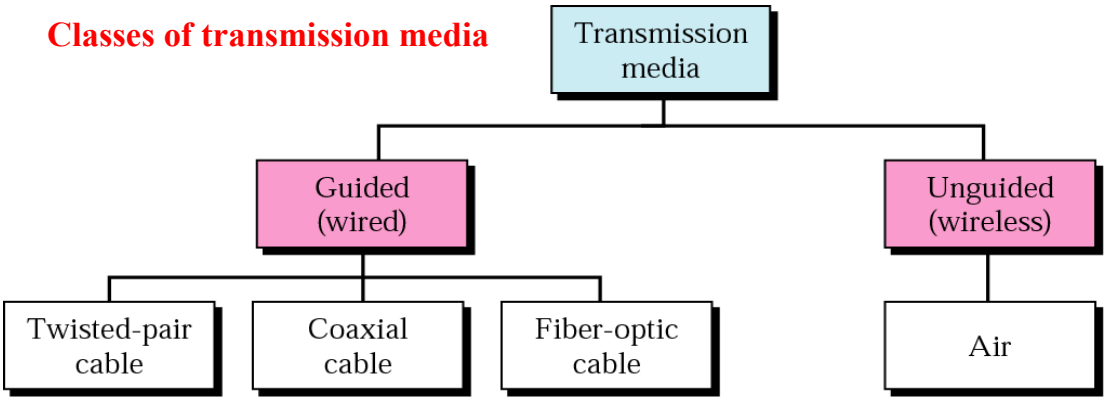
Communication media /Transmission Media

The transmission medium is the physical path by which a message travels from sender to receiver.

Data communication media can be divided into two categories:

- Physical transmission media (wired)
- Wireless transmission media

Classes of transmission media



PHYSICAL TRANSMISSION MEDIA

It uses wires, cables and other tangible materials to send communication signals. These include;

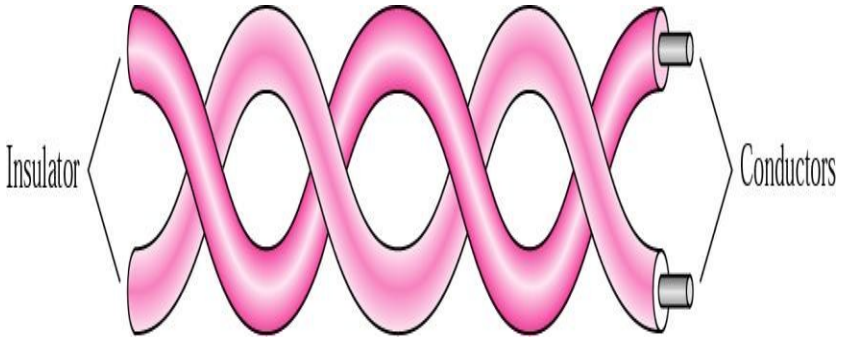
- Twisted-pair cable
- Coaxial cable
- Fiber-optic cable

Twisted-pair cable

Twisted pair consists of two conductors (normally copper), each with its own plastic insulation, twisted together.

Twisted-pair cable comes in two forms: unshielded and shielded

The twisting helps to reduce the interference (noise) and crosstalk.



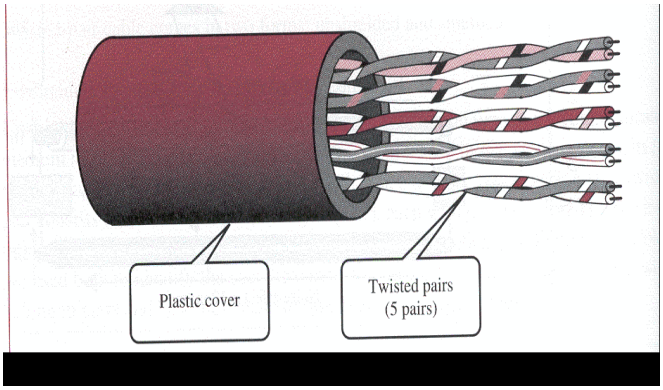
Unshielded Twisted-pair (UTP) cable

Any medium can transmit only a fixed range of frequencies!

UTP cable is the most common type of telecommunication medium in use today. The range is suitable for transmitting both data and video.

Advantages of UTP

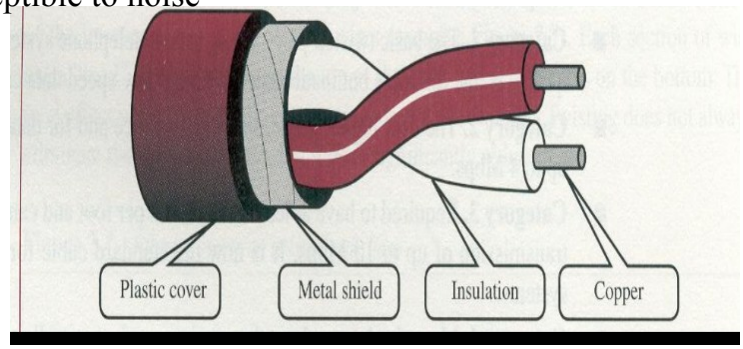
- it's cheaper
- it is flexible and easy to install



Shielded twisted (STP) Cable; STP cable has a metal foil or braided – mesh covering that enhance each pair of insulated conductors.

The metal casing prevents penetration of electromagnetic noise.

Materials and manufacturing requirements make STP expensive than UTP but less susceptible to noise



Applications

- Twisted-pair cables are used in telephone lines to provide voice and data channels.
- The DSL lines that are used by the telephone companies to provide high data rate connections also use the high-bandwidth capability of unshielded twisted-pair cables.
- Local area networks, such as 10Base-T and 100Base-T, also used UTP cables

Coaxial Cable; A coaxial cable has a single copper conductor at its center. A plastic layer provides insulation between the center conductor and braided metal shield.

The metal shield helps block any outside interference from fluorescent lights, motors and other computers.

Coaxial cables have bandwidths of up to 1GB ps. They are installed in a network to form the network backbone (link that connects two or more separate local areas networks.

Advantages

- It is highly resistant to signal interference
- It can support greater cable lengths between network devices than twisted pair cable.

Disadvantages

- It is difficult to install

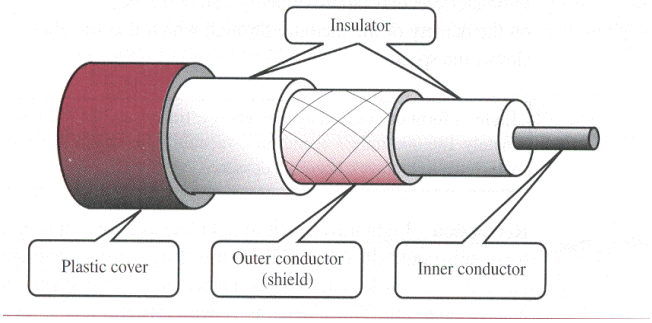
  Coaxial cable standards:

  RG-8, RG – 11 are used in thick Ethernet,

  RG – 58 used in thin Ethernet

  RG – 59 used for T

  Optic fiber cable; optic fiber cable uses light signals to transmit data from one point to another on the network. The electrical signals from the source are converted to light signals which are then propagated along the fiber optic cables. This eliminates the problem of electrical interference.



Fiber optic cabling consists of a center glass core surrounded by several layers of protective materials.

Advantages of fiber optic cables.

- Can transmit signals over much longer distances than coaxial and twisted pair
- They are not affected by electrical interference such as lighting and power surges
- They are thinner and lighter than coaxial cable
- They provide greater security because they are difficult to tap into
- They have a high transmission rate and a low error rate
- They can carry a thousand of separate signals

Disadvantages

- **They** are expensive
- **They** are difficult to install and modify.

Unshielded media (wireless communication); this is a type of media that is used to transmit data from one point to another without physical links established between two or more devices.

Wirelesses are used when it is inconvenient, impractical, or impossible to install.

Types of wireless transmission media

Infrared rays; this is a wireless transmission medium that send signals using infrared light waves.

Infrared transmission requires a line of sight transmission that is the sender and the receiver must be aligned so that nothing obstructs the path of infrared light wave. Communication devices should be close to each other (about 5 meters)

Radio waves. Radio waves are used to transmit television and radio signals. They can penetrate through walls and structures alike. The power of radio waves decreases sharply as they cover long distance unlike micro wave. Bluetooth technology also uses radio waves.

Micro waves. Microwaves are extremely high frequency radio waves. Unlike radio waves, microwave signals must be transmitted in a straight line with no obstructions between microwave antennas. Because micro waves travel in straight lines, both sender and receiver must be aligned to be strictly in line of sight.

Advantages of wireless transmission media

- Wireless medium is flexible in operation as compared to wired medium i.e. devices can be moved around without losing access to the network.
- Wireless network covers large geographical areas easily.
- Can take place via satellite even in very remote areas that do not have high cost physical infrastructure like telephone lines

Disadvantages

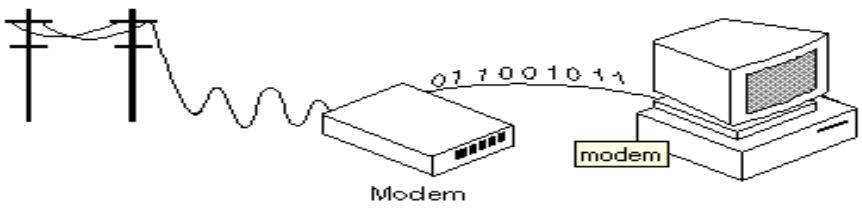
- It is relatively difficult to establish or configure
- The initial cost is very high.
- Signals can be easily blocked by thick material.

COMMUNICATION PROCESSORS

1. **Modem**; A combined device for modulation and demodulation

Or

A device that translates analog signals to digital signals and vice versa
Modems modulate and demodulate computer data for transmission on telephone lines.



Computer information is stored digitally, whereas information transmitted over telephone lines is transmitted in the form of analog waves. A modem converts

between these two forms.

2. **Multiplexer;** Multiplexing is carrying multiple signals/messages on one medium/channel. E.g. multiple TV stations in air medium, FM radio broadcasting. Each separate signal is called a channel.

3. Front end processor; **a computer that handles communications processing for a mainframe. It connects to the communications lines on one end and the mainframe on the other. It transmits and receives messages, assembles and disassembles packets and detects and corrects errors. It is sometimes synonymous with a communications controller, although the latter is usually not as flexible.**

4. A **duplexer; is** a device that allows bi-directional (duplex) communication over a single channel.

It is a switching device used in radar to permit alternate use of the same antenna for both transmitting and receiving

They allow transmission and receiving on the same antenna at the same time and reject unwanted signals

In radar and radio communications systems, it isolates the receiver from the transmitter while permitting them to share a common antenna.

5. Encoder; An **encoder** is a device, circuit, transducer, software program that converts information from one format or code to another, for the purposes of standardization, speed, secrecy, security, or saving space by shrinking size.

6. A **decoder** is a device which does the reverse of an encoder, undoing the encoding so that the original information can be retrieved. The same method used to encode is usually just reversed in order to decode. Decoding is necessary in applications such as data multiplexing

An extranet is a private network that uses Internet technology and the public telecommunication system to securely share part of a business's information or operations with suppliers, vendors, partners, customers, or other businesses. An extranet can be viewed as part of a company's intranet that is extended to users outside the company. It has also been described as a "state of mind" in which the Internet is perceived as a way to do business with other companies as well as to sell products to customers.

7. Integrated Services Digital Network (ISDN)

ISDN is an international standard for the digital transmission of both voice and data. Using ISDN lines, data can be transmitted over one or more separate channels at up to 2.2 billion bits per second if fiber-optic cables are used. This higher 64,000-bit transmission system allows full motion video images to be transmitted.

8. Asynchronous Transfer Mode technology consists of electronic packet switches to which computers can connect

FACTORS THAT AFFECT DATA TRANSMISSION

1. **Frequency:** This Refers to the cycle of waves per second. The amount of data that can be transmitted depends on the wave frequency. Frequency is expressed in hertz
2. **Band width:** This is the difference between the highest and lowest frequency (+max 2 – min).The higher the bandwidth the higher the rate of data transmission.
3. **Transmission impairments:** Such as attenuation and electromagnetic interference

PACKET SWICTHING

This is a technique for dividing electronic messages into packets for transmission over the network to their destinations through most expedient route.

Advantages

- It can handle high volume traffic in a network
- Allow more users to share the network
- Appropriate for sending messages over long distances such as across the country.
- It is used in large networks such as telnet

HOW PACKET SWITCHING OPERATES

A sending computer breaks an electronic message in to packets

The various packets are sent through a communication network

The message is sent thru different routes, at different speeds and sand witched

between packets from messages.

Once the packets arrive at their destination, the receiving computer re-assembles them in to a proper sequence to form a complete message.

NETWORKING

What is computer network? It is an interconnection of computers in order to share resources. Like files and printers.

A network consists of two or more computers/computing devices that are linked in order to share resources, exchange files, or allow electronic communications. The computers on a network may be linked through cables, telephone lines, radio waves, satellites, or infrared light beams.

TYPES OF NETWORKS

The three basic types of networks include: LAN, MAN and WAN.

LOCAL AREA NETWORK (LAN)

A network is said to be Local Area Network (LAN) if it is confined relatively to a small area. It is generally limited to a building or a geographical area expanding not more than a mile apart to other computers.

LAN configuration consists of:

- A **file server** - stores all of the software that controls the network, as well as the software that can be shared by the computers attached to the network.
- **A workstation** - computers connected to the file server (Mac or PCs). These are less powerful than the file server
- **Cables** - used to connect the network interface cards in each computer

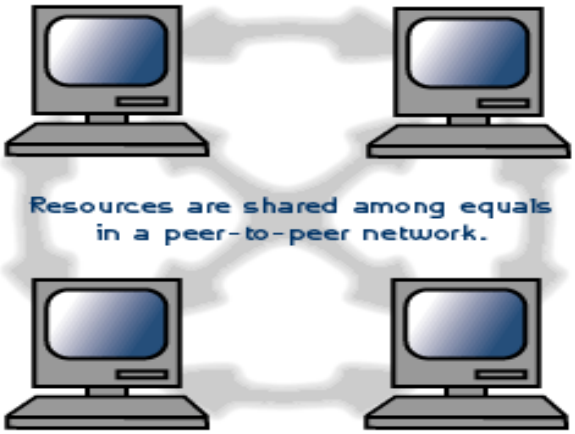
Types of LANs / Network models

- Peer-to-Peer
- Client/Server

PEER-TO-PEER

Peer-to-peer network operating systems allow users to share resources and files located on their computers and to access shared resources found on other computers. However, they do not have a file server or a centralized management source. (See figure below)

In a peer-to-peer network, all computers are considered equal; they all have the same abilities to use the resources available on the network. Peer-to-peer networks are designed primarily for small to medium local area networks.
AppleShare and Windows for Workgroups are examples of programs that can function as peer-to-peer network operating systems.



Advantages of peer to peer network

- Less initial expense – no need for a dedicated server
- Set up – an operating system (such as windows 7) already in place may only need to be configured for peer to peer operations.

Disadvantages

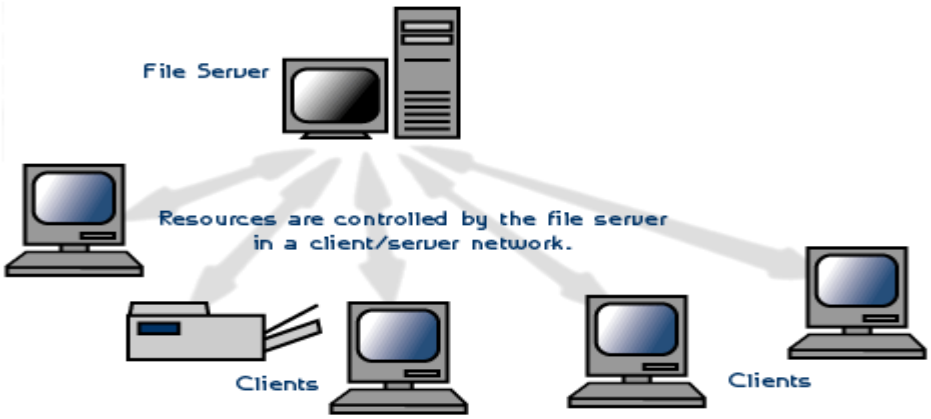
- Decentralized – no central responsibility for files and applications
- Security – does not provide the security on available client/server network.

Client/server; this network allows the network to centralize functions and applications in one or more dedicated file servers.

The file servers become the heart of the system, providing access to resources and providing security. Individual workstations (clients) have access to the resources on the file servers. The network operating system provides the mechanism to integrate all the components of the network and allow multiple users to simultaneously share the same resources irrespective of the physical location. Novell NetWare and windows 2000 server are examples of client/server network operating systems.

Differentiate between a server and a client computer.

A server is a centralized computer that controls the shared resources on the network While is a client computer that sends request to the server and depends on the server



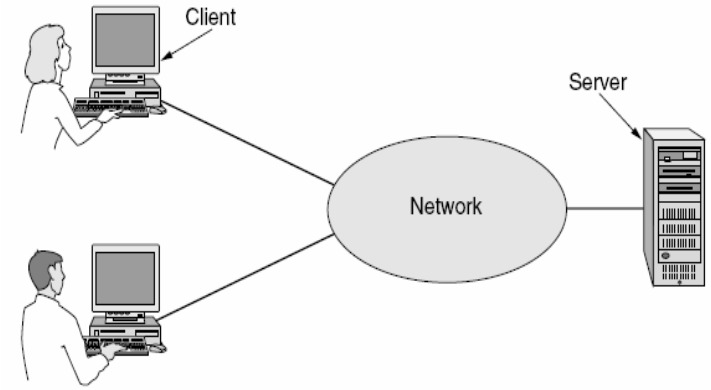
Advantages of a client/server network:

- Centralized – resources and data security are controlled though the server.
- Scalability – any or all elements can be replaced individually as increase.
- Flexibility – new technology can be easily integrated into the system
- Interoperability – all components (clients/networks/servers) work together
- Accessibility - Servers can be accessed remotely and across multiple platforms.

Disadvantages of a client/server network:

- Expense - Requires initial investment in dedicated servers.
- Maintenance - Large networks will require a staff to ensure efficient operation.
- Dependence - When server goes down, operations will cease across the network.

Client-server model



METROPOLITAN AREA NETWORK (MAN)

Metropolitan Area Network (MAN) covers larger geographic areas, such as cities. Often used by local libraries and government agencies often to connect to citizens and private industries

WIDE AREA NETWORK (WAN)

Wide Area Networks (WANs) connects larger geographic areas, such as London, the UK, or the world. In this type of network dedicated transoceanic cabling or satellite uplinks may be used.

Advantages of computer Networks

1. Speed. Networks provide a very rapid method for sharing and transferring files. Without a network, files are shared by copying them to floppy disks, then carrying or sending the disks from one computer to another. This method of transferring files (referred to as sneaker-net) is very time-consuming.

2. Cost. Networkable versions of many popular software programs are available at considerable savings when compared to buying individually licensed copies. Besides monetary savings, sharing a program on a network allows for easier upgrading of the program. The changes have to be done only once, on the file server, instead of on all the individual workstations.

3. Security. Files and programs on a network can be designated as "copy inhibit," so that you do not have to worry about illegal copying of programs. Also, passwords can be established for specific directories to restrict access to authorized users.

4. Centralized Software Management. One of the greatest benefits of installing a network at a school is the fact that all of the software can be loaded on one computer (the file server). This eliminates the need to spend time and energy installing updates and tracking files on independent computers throughout the building.

5. Resource Sharing. Sharing resources is another area in which a network exceeds stand-alone computers. Most schools cannot afford enough laser printers, fax machines, modems, scanners, and CD-ROM players for each computer. However, if these or similar peripherals are added to a network, they can be shared by many users.

6. Electronic Mail. The presence of a network provides the hardware necessary to install an e-mail system. E-mail aids in personal and professional communication for all school personnel, and it facilitates the dissemination of general information to the entire school staff. Electronic mail on a LAN can enable students to communicate with teachers and peers at their own school. If the

LAN is connected to the Internet, students can communicate with others throughout the world.

7. **Flexible Access**. School networks allow students to access their files from computers throughout the school. Students can begin an assignment in their classroom, save part of it on a public access area of the network, and then go to the media center after school to finish their work. Students can also work cooperatively through the network.
8. **Workgroup Computing**. Workgroup software (such as Microsoft BackOffice) allows many users to work on a document or project concurrently. For example, educators located at various schools within a county could simultaneously contribute their ideas about the new curriculum standards to the same document and spreadsheets.

Disadvantages of computer Networks

9. **Expensive to Install**. Although a network will generally save money over time, the initial costs of installation can be prohibitive. Cables, network cards, and software are expensive, and the installation may require the services of a technician.
10. **Requires Administrative Time**. Proper maintenance of a computer network requires considerable time and expertise. Many schools have installed a network, only to find that they did not budget for the necessary administrative support.
11. **File Server May Fail**. Although a file server is no more susceptible to failure than any other computer, when the files server "goes down," the entire network may come to a halt. When this happens, the entire school may lose access to necessary programs and files.
12. **Cables May Break**. The Topology chapter presents information about the various configurations of cables. Some of the configurations are designed to minimize the inconvenience of a broken cable; with other configurations, one broken cable can stop the entire network.

- Server faults stop applications being available
- Network faults can cause loss of data.
- Network fault could lead to loss of resources
- User work dependent upon network

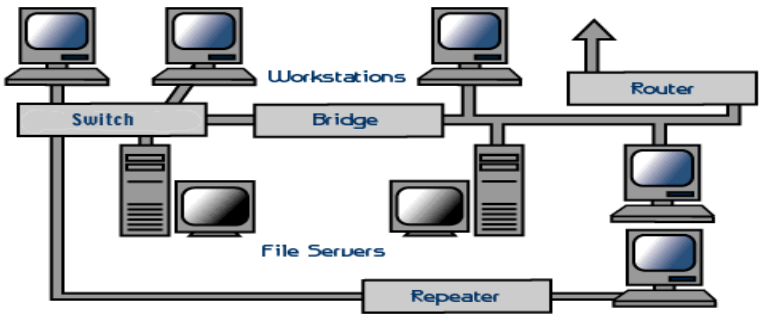
- System open to hackers
- Decisions tend to become centralized
- Could become inefficient
- Could degrade in performance
- Resources could be located too far from user

Advantages of Computer Networking

- Easy Communication and Speed; It is very easy to communicate through a network. People can communicate efficiently using a network with a group of people. They can enjoy the benefit of emails, instant messaging, telephony, video conferencing, chat rooms, etc.
- Ability to Share Files, Data and Information; This is one of the major advantages of networking computers. People can find and share information and data because of networking. This is beneficial for large organizations to maintain their data in an organized manner and facilitate access for desired people.
- Sharing Hardware; another important advantage of networking is the ability to share hardware. For an example, a printer can be shared among the users in a network so that there's no need to have individual printers for each and every computer in the company. This will significantly reduce the cost of purchasing hardware.
- Sharing Software; Users can share software within the network easily. Networkable versions of software are available at considerable savings compared to individually licensed version of the same software. Therefore large companies can reduce the cost of buying software by networking their computers.
- Security; Sensitive files and programs on a network can be password protected. Then those files can only be accessed by the authorized users. This is another important advantage of networking when there are concerns about security issues. Also each and every user has their own set of privileges to prevent those accessing restricted files and programs.
- Speed; Sharing and transferring files within networks are very rapid, depending on the type of network. This will save time while maintaining the integrity of files.

Disadvantages of Networking

- Breakdowns and Possible Loss of Resources; One major disadvantage of networking is the breakdown of the whole network due to an issue of the server. Such breakdowns are frequent in networks causing losses of thousands of dollars each year. Therefore once established it is vital to maintain it properly to prevent such disastrous breakdowns. The worst scenario is such breakdowns may lead to loss of important data of the server.
- Expensive to Build; Building a network is a serious business in many occasions, especially for large scale organizations. Cables and other hardware are very pricey to buy and replace.
- Security Threats; Security threats are always problems with large networks. There are hackers who are trying to steal valuable data of large companies for their own benefit. So it is necessary to take utmost care to facilitate the required security measures.
- Bandwidth Issues; in a network there are users who consume a lot more bandwidth than others. Because of this some other people may experience difficulties.
- **Networking Hardware;** networking hardware includes all computers, peripherals, interface cards and other equipment needed to perform data-processing and communications within the network.



This section provides information on the following components:

- File Servers
- Workstations
- Network Interface Cards
- Switches

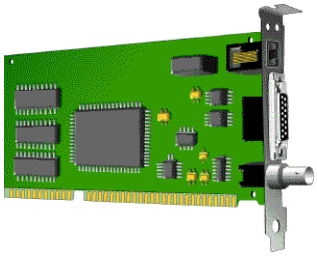
- Repeaters
- Bridges
- Routers

File Servers; A file server stands at the heart of most networks. It is a very fast computer with a large amount of RAM and storage space, along with a fast network interface card. The network operating system software resides on this computer, along with any software applications and data files that need to be shared.

The file server controls the communication of information between the nodes on a network. This requires a computer that can store a lot of information and share it very quickly.

All of the user computers connected to a network is called workstations. A typical workstation is a computer that is configured with a network interface card, networking software, and the appropriate cables.

Network Interface Cards



The network interface card (NIC) provides the physical connection between the network and the computer workstation. Most NICs are internal, with the card fitting into an expansion slot inside the computer.

Bridge; Connects multiple network segments together

It's an electronic device that connects two similar networks and controls the data flow between them.

Router; An electronic hardware device that directs data packets to a secure path to the final destination

Gateway; It's an electronic hardware device that can perform logical functions. A gateway is a device or system (collection of hardware and software) that connects two networks and translates information from one to the other so that data can be transmitted between two dissimilar networks.

Repeater; A hardware device which is used to join same type of networks to extend the length of the communication medium It also simplifies the signals received from one network and sends the amplified signals to another network.

Switch Joins multiple computers to the network

TOPIC 12: ELECTRONIC PUBLICATION

TOPIC 13: ELECTRONIC SPREDSHEETS II

TOPIC 14: DATABASES

TOPIC 15: SYSTEM SECURITY, ICT ETHICAL ISSUES AND EMERGING TECHNOLOGIES

WHAT IS COMPUTER SECURITY? Refers to a computer code or program specifically designed to damage or cause irregular behavior in other computer programs

Most common computer security threats and what you can do to protect yourself from them.

A threat, in the context of computer security, refers to anything that has the potential to cause serious harm to a computer system.

THREAT 1: VIRUS; A **virus** is a piece of software that can replicate itself and infect a computer without the permission or knowledge of the user. A virus can only spread when it is transmitted by a user over a network or the Internet, or through removable media such as CDs or memory sticks.

Prevention, detection and removal:

Antivirus software detects and eliminates known viruses.

THREAT #2: SPAM / SPIM / SPIT; **SPAM is** the sending of e-mail messages in bulk which are unnecessary. Email addresses are collected from chat rooms, websites, and newsgroups and by Trojans which harvest users' address books.

SPIM is spam sent via instant messaging systems such as Yahoo! Messenger, MSN, Messenger and ICQ.

SPIT is Spam over Internet Telephony. These are unwanted, automatically-dialed, pre-recorded phone calls using Voice over Internet Protocol (VoIP).

Prevention, detection and removal:

ISPs attempt to choke the flood of spam by examining the information being sent and traffic patterns. User systems may use spam filters to screen out email messages with suspect titles or from suspect persons, as well email messages from blocked senders.

THREAT #3: SPOOFING, PHISHING AND PHARMING

Spoofing is an attack in which a person or program masquerades (false show /pretense) as another. A common tactic is to spoof a URL or website (see phishing).

Phishing is a common form of spoofing in which a phony webpage is produced that looks just like a legitimate web page. The phony page is on a server under the control of the attacker. Criminals try to trick users into thinking that they are connected to a trusted site, and then harvest user names, passwords, credit card details and other sensitive information.

Phishing is typically carried out by email or instant messaging. The email message claims to be from a legitimate source but when the user clicks on the link provided, he or she lands on the fake web page.

Pharming is an attack in which a hacker attempts to redirect a website's traffic to another, bogus website. Pharming can be conducted either by changing the hosts file on a victim's computer or by exploitation of a vulnerability in DNS server software. DNS servers are computers responsible for resolving Internet names into their real IP addresses — the servers are the "signposts" of the Internet.

Prevention, detection and removal:

As spoofing, phishing, and to a lesser extent, pharming, rely on tricking users rather than advanced technology, the best way to handle these threats is through vigilance. Don't open emails from unknown sources or click on links embedded in suspect messages.

Check the security guidelines of websites such as PayPal so that you can distinguish between legitimate and bogus emails.

THREAT #4: SPYWARE. Spyware is software that aids in gathering information about a person or organization without their knowledge and that may send such information to another entity without the consumer's consent.

Spyware is software that is secretly installed on a computer without the user's consent. It monitors user activity or interferes with user control over a personal computer.

Prevention, detection and removal: Anti-spyware programs can combat spyware in two ways:

1. **Real-time protection:** these programs work just like anti-virus software. They scan all incoming network traffic for spyware software and block any threats that are detected.
2. **Detection and removal:** users schedule daily, weekly, or monthly scans of their computer to detect and remove any spyware software that has been installed. These antispyware programs scan the contents of the Windows registry, operating system files, and programs installed on your computer. They then provide a list of threats found, allowing the user to choose what to delete and what to keep. Some popular antispyware programs are Spy bot - Search & Destroy, PC Tools' Spyware Doctor, as well as commercial offerings from Symantec, McAfee, and Zone Alarm.

THREAT #5: KEYSTROKE LOGGING (KEYLOGGING)

A **key logger** is a software program that is installed on a computer, often by a Trojan horse or virus. Key loggers capture and record user keystrokes. The data captured is then transmitted to a remote computer.

Prevention, detection and removal:

For the time being, therefore, the best strategy is to use common sense and a combination of several methods:

Monitoring which programs are running: a user should constantly be aware of which programs are installed on his or her machine.

Antispyware: antispyware applications are able to detect many key loggers and remove them.

Anti-key logging software: keylogger detection software packages use "signatures" from a list of all known key loggers to identify and remove them.

THREAT #6: ADWARE

Adware is software which automatically plays, displays, or downloads advertisements to a computer. The adware runs either after a software program has been installed on a computer or while the application is being used. In some cases, adware is accepted by users in exchange for using software free-of-charge. Not all adware is innocuous, however. Some types of adware are also spyware and therefore a threat to privacy.

Prevention, detection and removal:

As adware is also often spyware or malware, programs have been developed to detect, quarantine, and remove both spyware and adware. Ad-Aware and Spy bot - Search & Destroy are two commonly used programs.

THREAT #7: BOTNET

A **Botnet** (also called a "zombie army") is a collection of software robots, or bots, that run automated tasks over the Internet. The term "botnet" is generally used to refer to a distributed network of compromised computers (called "zombie computers"). These "zombies" typically run programs such as worms, Trojan horses, or backdoors.

Botnets are frequently used to launch Distributed Denial-of-Service (DDoS) attacks against websites. Newer bots can automatically scan their environment and propagate themselves using vulnerabilities and weak passwords.

Prevention, detection and removal:

Detection focuses on either the computer itself or the network. Both approaches use trial and error to try to identify bot behavior patterns.

THREAT #8: WORM

A computer worm is a self-replicating, malicious software program. Unlike a virus, it does not need to attach itself to an existing program or require user intervention to spread. It uses a network to send copies of itself to other computers on the network.

Prevention, detection and removal:

Since worms spread by exploiting vulnerabilities in operating systems, computers should be kept current with the latest security updates or "patches" from operating system vendors.

To prevent infection, users need to be wary of opening unexpected emails and should not run attached files or programs, or visit websites that are linked to such emails. Users should be constantly on guard against phishing.

Antivirus and antispyware software, if kept up-to-date, are also helpful, as is the use of a firewall.

THREAT #9: TROJAN HORSE

A **Trojan horse** or **Trojan** is a piece of software which – like the Trojan Horse of Greek mythology – conceals a payload (often malicious) while appearing to perform a legitimate action. Trojan horses often install "backdoor programs" which allow hackers a secret way into a computer system.

Prevention, detection and removal:

Normally, antivirus software is able to detect and remove Trojan horses automatically. They may also be deleted by clearing the temporary Internet files on

a computer, or by finding the offending file and deleting it manually (in safe mode).

THREAT #10: BLENDED THREAT

A **blended threat** is a threat that combines different malicious components, such as a worm, a Trojan horse and a virus. In this way, a blended threat uses multiple techniques to attack and propagate itself.

Prevention, detection and removal:

See respective entries for worm, Trojan horse and virus.

THREAT #11: DENIAL-OF-SERVICE ATTACK (DOS ATTACK)

As its name implies, a **Denial-of-Service** or **DoS** attack is an attempt to make a computer resource such as a website or web service unavailable to users. One of the most common methods of attack involves saturating the target (victim) machine with external communications requests.

Prevention, detection and removal:

Surviving an attack: The easiest way to survive an attack is to plan ahead. Set aside a separate emergency block of IP addresses for critical servers with a separate route.

Firewalls: Security device or software that regulates access into & out of a company's network based on a set of rules.

Questions:

a) **What is computer virus?** Refers to a computer code or program specifically designed to damage or cause irregular behavior in other computer programs.

b) As an A level subsidiary ICT student, explain any three practices to guard against computer viruses.

- **Scan your computer on a regular basis** –scan your system with up-to-date anti-virus software regularly.
- **Update your anti-virus software on a regular basis** –keep your antivirus software up-to-date. Do this at least weekly and more often if there are news reports of a new virus threat.
- **Backup your files on a regular basis**-Always maintain copies of files you can't do without, just in case your computer gets infected and crushes.
- **Turn off E-mail preview service** if your E-mail software has one.
- **Scan your disks** – Scan your storage disks from other computers with antivirus software before you use them. If a virus is found, most programs will give you

several choices about what to do, such as removing the virus, doing nothing, or deleting the file that contains the virus.

- **Scan downloaded files** – Scan downloaded internet files with anti-virus software before you use or run them.
- **Scan all E-mail attachments** – if you receive any attachment you need to view**, scan** it with antivirus program before you open it.

c) List four symptoms a virus infected computer might have.

- Partition that seem to disappear
- Hard disks that won't boot
- Computer programs take longer to boot than normal
- Corrupted hard disk data
- System slowdown
- Program sizes keep changing
- System crushes or hangs up.

d) Explain how viruses are spread on standalone and networked computers.

WAYS OF SPREADING COMPUTER VIRUSES

There are many ways in which a virus can spread from one computer to another, but let's take a look at the most frequent ways in which people run into viruses, spyware and Trojans on the internet.

1. **Email attachments**. Some email attachments carry viruses. The infection rate from email attachments is significantly lower, but it can still be a common problem. The rule is to scan all attachments before opening them.
2. **Rogue websites**. Your computer may become infected with **spyware** or **a virus** by just visiting a website. Many adult websites, gambling websites and other less than trustworthy websites normally attempt to automatically access your computer when you visit them. They often install adware bugs that will cause an outbreak of **pop ups** to appear on your screen. To stop those rogue websites, **adjust the settings on your antivirus software** and **firmware** so that no outside connections can be made and no programs can be installed without your permissions.
3. **Instant messaging.** It is difficult to find a computer in this digital age that doesn't have at least one instant messaging service installed on it.

Unfortunately, these programs are often targeted by hackers who use them as a medium to trick people into **clicking links that lead them to ROGUE WEBSITES that have viruses with them.** Only chat with people you know and never follow links to sites that you don't recognize.

4. **Networks.** If your computer is connected to a home network or is part of a larger network, it may be infected with viruses. Just ensure that you install up- to-date antivirus software so that the invading bugs can be removed as quickly as possible.
5. **Infected boot disks.** Now that hard drives are obscenely large, the over whelming percentage of us don't bother to use boot disks anymore, but a virus can still be spread if an infected disk is in your hard drive and you attempt to restart. When you start your computer, your machine will always check your drives to see if **a disk with boot information is present.** If it's present your computer will automatically attempt to boot from the hard disk and not from your drive. If the virus is present, it will often be activated and you will become infected.
6. **Phishing schemes.** Refers to ways in which people end up with their identity stolen and a computer filled with viruses. A phishing scheme starts when you receive an email from a website claiming to be **your bank or Credit Card Company.** You are asked to click a link and login, **but the truth is that you've just given away all of your information.** Often times when you visit these sites, spyware, adware and viruses are automatically installed on your computer.

7. Infected software. One of the great things on the internet is how many **free programs and free games** there out and they come at a price. Too many rogue websites intentionally infect their freeware (**e.g. Kazaa**) with **Trojan viruses** so that you unknowingly infect your computer every time you download a free game or piece of software. The key here is to only download freeware or shareware from trusted sources.

8. **Hackers.** Today, people understand the value of good online protection, but hackers can still pose a problem if you allow your protection software to lapse. The best way to beat hackers is to ensure that you have a **fire wall** and **up-to-date antivirus software.**

9. **Fake antivirus software.** This is on me of the most frustrating ways to

become infected with a virus or worm. There are dozens of antivirus and anti-spyware program you can download for free on the internet and a surprising number of the actually do exactly the opposite of what they claim. Only download antivirus programs from trusted sites or from websites that u knows are **completely legitimate. 10. from mobile devices.** Today, mobile some devices are also a target by virus creators. Before plugging Ur mobile phone into your computer, ensure that you have up-to-date antivirus software.

Define the following terms?

1. **Systems analysis** is the dissection of a system into its component pieces to study how those component pieces interact and work.
2. **System analyst** is a person who researches problems, plan solutions, recommends software's and systems at least at the functional levels and co-ordinates development to meet business or other requirements.

A system analyst does the following.

a. Identifies, understands, and plans for the organize, and plans for the organization planned systems, and ensure that new technical requirements are properly intergraded with existing processes and skill sets.
b. Plans a new system from the beginning to the end.
c. Interacts with the internal users and customers to learn and document requirements that shall be used to produce business requirements documents.
d. Write technical requirements from a critical phase.
e. Interact with designers to understand software limitations.
f. Help programmers during system development; provide use cases, flowcharts or even data base design.
g. Perform system setting.
h. Deploy the completed system.
i. Document requirements or contribute to user manuals.
j. Whenever a development process is conducted, the system analyst is responsible for designing components and providing that information to the developer.

3. **Expert system** is a computer system that imitates the decision making ability of a human expert. Expert systems are designed to solve complex

problems by reasoning about knowledge, like an expert, and not by following the procedure of a developer as is the case in conversional programming. The first expert systems were created in the **1970's.**

4. **Artificial intelligence (AI)** is technology and a branch of computer science that studies and develops intelligent machines and software.

State examples of data threats and give ways of curbing these threats.

Identify appropriate ways of protecting data in a computer system.

Save as you work. You should always save your work as you go and learn how to use the 'auto-save' features in your application.

Make a backup. Before you make changes to critical data always make a duplicate. Even if you just made a backup yesterday-make another.

Keep a copy of your data offsite. Keep a copy of your data offsite. If there were a fire or other disaster, your onsite data backup will be lost as well.

Never open email attachments by habit. If your email reader has an option to automatically open attachments **you should disable that feature.** Always run any attachments and downloaded files through a virus scanner first.

Never trust disks from other people. Anytime you receive a file on any type of storage media check it first for viruses.

Update! Make sure you have the latest updates for your software – especially for your virus checking software. Make it a habit to regularly check for updates and enable automatic updates for soft ware's that offers that feature.

Protect your passwords. Your USERID is your identity. The key to your identity is your **password** .anytime your account accesses the network you are responsible for any activity from the account! Remember to change your password on a regular basis

Protect your computer. Use secure operating system which requires users to be authenticated. As an added benefit these operating systems also restrict what individual users can see or do on the system.

Perform regular maintenance. Learn how to use utilities that diagnose the system for problems. It I a good idea to run a disk-scanning program, defragment your hard drive, or whatever else your system might need. These utilities can prevent little problems from becoming big problems, and will keep your system running at a top speed.

Computer crime

It refers to any crime that involves a computer and a network. The computer may have been used to carry out a crime, or it may be the target.

Computer crime is a form of crime where the Internet or computers are used as a medium to commit crime.

These include: Hacking, Denial of service attacks, Unauthorized use of services Cyber vandalism, Copyright infringement, Child pornography, Fraud, Child pornography, Money laundering, and counterfeiting, Cyber terrorism, Phishing, Pharming, Spoofing, Malware such as viruses, Identity theft and Cyber stalking

Hacking is the activity of breaking into a computer system to gain unauthorized access to information. The unauthorized revelation of passwords with intent to gain unauthorized access to private communication of a user is one of widely known computer crimes. Another highly dangerous computer crime is the hacking IP addresses in order to transact with a false identity, thus remaining anonymous without carrying out the criminal activities.

Phishing is the act of attempting to acquire sensitive information like user name password and credit card details by distinguishing as a trustworthy source. Phishing is carried out through emails or by luring the users to enter personal information through websites. Criminals often use websites that have a look and fill of some popular webs which makes the users feel safe to enter their details there.

Computer viruses are computer programs that can replicate themselves and harm computer systems on a network without the knowledge of the system users.

Viruses spread to other computers through sharing infected network files, through the network as a transport medium, by the means of removable devices

like **USB drives**, DVDs**, CDS.**

Cyber stalking; the use of communication technology e.g. the internet to stalk a person online. The stalker sends threatening emails spreads false information and accusation, transmits threats on the internet and damages data and equipment.

Cyber stalkers often target the users by means of **chartrooms, online forums** and social **networking websites** to gather information and harass the users on the basis of the information gathered, obscene **emails, abusive phone calls**

Identity theft involves stealing money and obtaining other benefits by using another person's identity. It is the act of pretending to be someone else by using someone else's identity as ones' own. Financial identity theft involves the use of false identity to obtain goods and services and a commercial identity theft is the using of someone else's business name or credit card details for commercial purposes. Identity cloning is the use of another user's information to pose as a false user. Illegal migration, terrorism and black mail are often made possible by means of identity theft.

Cyber extortion is a form of cyber terrorism in which a website, e-mail server, or computer system is subjected to repeated denial of service or other attacks by malicious hackers, who demand money in return for promising to stop the attacks. Cyber terrorism in general, can be defined as an act of terrorism committed through the use of cyberspace or computer resources.

Crimes that primarily target computer networks or devices include:

- Computer viruses
- Denial-of-service attacks
- Malware (malicious code)

Crimes that use computer networks or devices to advance other ends include:

- Cyber stalking
- Fraud and identity theft
- Information wa0rfare
- Phishing scams

Spam; Spam, or the unsolicited sending of bulk email for commercial purposes, is

unlawful in some jurisdictions. While anti-spam laws are relatively new, limits on unsolicited electronic communications have existed for some time.[8]

Fraud: Computer fraud is any dishonest misrepresentation of fact intended to let another to do or refrain from doing something which causes loss.

Other forms of fraud may be facilitated using computer systems, including bank fraud, identity theft, extortion, and theft of classified information

Drug trafficking; **Drug traffickers are increasingly taking advantage of the Internet to sell their illegal substances through encrypted e-mail and other Internet Technology. Some drug traffickers arrange deals at internet cafes use courier Web sites to track illegal packages of pills, and swap recipes for amphetamines in restricted-access chat rooms.**

Cyber Crime" describes criminal activities committed through the use of electronic communications media. Or Cyber crime can mean any criminal activity that takes place over the Internet. Examples include fraud,

How to control computer crime

Just like any sort of crime, common sense is your most valuable ally when dealing with cyber criminals, never open suspicious documents.

Don't give out personal information to people you don't know. And be wary when approached with a suspicious proposition.

Learn about cyber crime and talk to your family about how to identify scams. Never give out your personal information to anyone you do not know on the Web.

Use a firewall to protect your computer from hackers. Most security software comes with a firewall. Turn on the firewall that comes with your router as well.

Purchase and install anti-virus software such as McAfee or Norton Anti-Virus. AVG offers free anti-virus protection if you do not wish to purchase software.

Shop only at secure websites. Look for a Trustee or VeriSign seal when checking out. Never give your credit card information to a website that looks suspicious or to someone you don't know.

Use strong passwords on your accounts that are difficult to guess. Include both letters and numerals in your passwords. Never use a word that is easy to guess --

like your wife's name.

Keep watch over your children and how they use the Internet. Install parental control software to limit where they can surf.

Computer Ethics and integrity

- Computer ethics refers to a set of moral principles that regulate the use of computers.
- Or the human values and moral conduct relating to right and wrong behavior/decisions made when using computers.
- Computer integrity refers to steadfast loyalty to a strict moral or principled set of laws regarding computer use Some of the Computer ethics and integrity that should be put in mind when using computers include:
- **Respect the privacy of others.** Do not in any way examine or change files or passwords belonging to others. Do not violate the privacy of individuals or organizations.
- **Respect the integrity of the computing systems.** Do not develop or use programs that invade, damage, or alter computing systems or software. Do not in any way harass other users.
- **Always identify the user accurately.** Never use someone else's account. Do not use fraudulent means to avoid accounting for the use of computing services.
- **Respect copyrights and licenses.** To copy a licensed computer program is illegal; it is indeed theft.
- **Respect the intellectual property of others.** Individual programming assignments are expected to be done by individual students; do not take another's work or ideas to call your own.
- **Exhibit responsible, sensible use of computer hardware, software, and data.**

Emerging Technologies. These are technology innovations that are currently developing or are becoming common with a potential to transform an existing industry or field

Artificial intelligence. This is a computer science that is focused on creating computer systems that simulate human intelligence.

Digital forensics is a branch of forensic science encompassing recovery and investigation of material found in digital devices, often in relation to computer crime

Artificial reality: artificial or simulated reality that is generated in 3D by a computer and commonly known as VR, .artificial reality, virtual environments

Biometric devices; Devices used to identify a person by the measurement of biological features. These include; face scanner. This identify a person by taking measurements of a person's face e.g. the distance between the person's chin, eyes, nose and mouth. **Finger scanner**. A biometric finger scanner identifies the person by their finger print.

Retina or iris scanner; a biometric retina or iris scanner identifies a person by scanning the iris or retina of the eyes. These scanners are more secure biometric authentication schemes when compared to the other devices because there is no known way to duplicate the retina or iris.

Voice scanner; voice analysis scanner will mathematically break down a person's voice to identify them.

Computer professionals / careers; A computer professional or specialist is a person who works in the field of information technology. Below is a summary of common computer professionals.

Web developers. These design and create websites. They are responsible for the look of the site, the site's technical aspects like performance and capacity.
Software developers. These are the creative minds behind computer programs. Some develop applications that allow people to do specific tasks on a computer or another device.

Systems administrators. Systems administrators in organizations ensure that all computer systems are well configured and are working properly.

Network administrators. Computer networks are critical parts of almost every organization. Network administrators are responsible for the day the day-to-day operation of these networks.

Information security analysts. These plan and carry out security measures

to protect an organization's computer networks and systems. They are important in averting cyber attacks.

Database administrators. These use specialized software to store and organize data. They make sure that data are available to users and are secure from unauthorized access.

System analysts. These study an organization's current computer systems and procedures and design information systems solutions to help the organization operate more efficiently and effectively.

IT supports specialists. IT support specialists provide help and advice to people and organizations using computer software or equipment. They assist computer users who are having computer problems.

Programmers. These write and test code that allows computer applications and software programs to function properly.

Data analyst. A data analyst inspects, cleans, transforms and models data with the aim of discovering useful information, suggesting conclusions and supporting decision-making.

Computer technician. This is a person who repairs and maintains computers and servers. The technician's responsibilities may extend to include installing and updating software packages etc.

Network architects. Network architects design and build data communication networks, including local area networks, wide area networks and intranets.

STORAGE MEASUREMENT ISSUES

1. Bit; this is an equivalent of a single binary digit i.e. either 1 or 0.
2. Byte; this is the smallest unit for measuring computer memory. A byte is equivalent to eight (8) bits i.e. **1 byte = 8bits**
3. Character; this refers to any letter, number, symbol or anything that can be typed on a computer's screen. A character is equivalent to a byte i.e. **1character = 1 byte = 8 bits**
4. Kilobyte; this is approximately equal to a thousand bytes or 1024 bytes i.e. 1 KB = 1000 or 1024 bytes

5. Megabyte; it is approximately equal to one million bytes or 1048576 bytes i.e. **1 MB = 1000 or 1024 Bytes 1 MB = 1,000,000 bytes or 1048576 bytes**
6. Gigabyte; it is approximately equal to 1 billion bytes i.e. **1 GB = 1000 or 1024 MB, 1 GB = 1,000,000,000 or 1,073,741,824 bytes**
7. Terabyte; it is approximately equal to one trillion bytes i.e**. 1 TB = 1,000,000,000,000 bytes.**

Examples;

How many bits are in the word "school"?

School = 6 characters

1 character = 8 bits

6 characters = y

$$\frac{y \times 1\ character}{1\ character} = \frac{8bits \times 6\ characters}{1\ character}$$

Y = 8x6

Y= 48 bits

How many bytes are in 64 bits? Let the number of bytes be X

1 byte = 8 bits

X = 64

$$\frac{X \times 8\text{-}bits}{8\text{-}bits} = \frac{1\ byte \times 64\text{-}bits}{8\text{-}bits}$$

X = 8bytes

How many characters are in 1000 bytes?

1 byte = 1 character

1000 bytes = 1000 characters

The number of characters is 1000.

Convert 2000 MB into GB Let the number of GB is y.

1 GB = 1000 MB

$$\frac{Y \times 1000GB}{1000GB} = \frac{1GB \times 2000MB}{1000MB}$$

Y=2 GB

NETWORK TERMS

Internet; this is the world-wide network of computers accessible to anyone who knows their Internet Protocol (IP) address.

The IP address is a unique set of numbers (such as 209.33.27.100) that defines the computer's location.

Intranet is a private network that allows access to organization data/information to only members of the organization.

Extranet is a private network that allows access to organization data/information to members within the organization and some authorized outsiders like suppliers

Routers are physical devices that join multiple wired or wireless networks together

A Gateway is a device that acts like a security guard and only allows data in or out if it has the right network headers

A network switch is a small hardware device that joins multiple computers together within one local area network (LAN)

A hub is usually a small rectangular box, often made of plastic, which receives its power from an ordinary wall outlet. Or a multiport repeater to enhance signal within the same LAN

A hub joins multiple computers (or other network devices) together to form a single network segment

A packet is a formatted block of data carried by a computer network

Ethernet hubs are by far the most common type, but hubs for other types of networks such as USB also exist

A hub includes a series of ports that each accepts a network cable

Small hubs can network four computers together

They contain four or sometimes five ports

Firewall a machine and its software that serve as a special gateway to a network, protecting it from inappropriate access.

Ethernet is a physical and data link layer technology for local area networks (LANs).

Bandwidth. Bandwidth: amount of data that can be transmitted at a time or a rate of data transmission or a range of frequencies in a given transmission medium.

System recovery is the process of restoring the computer to its original settings. (Original factory software configuration)

What is System Restore?

System Restore is a recovery tool in Windows that allows you to reverse certain kinds of changes made to the operating system.

What is System Restore Used For?

System Restore is used to return important Windows files and settings like drivers, registry keys, system files, installed programs, and more - back to previous versions and settings.

The System Recovery Options menu is a group of Windows repair, restore, and diagnostic tools.

DEVICE DRIVERS; A device driver is a program that controls a particular type of device that is attached to your computer. There are device drivers for printers, displays, CD- ROM readers, diskette drives, and so on.

Plug-and-play; a **plug and play** is a specification that facilitates the discovery of a hardware component in a system without the need for physical device configuration or user intervention in resolving resource conflicts

Refers to the ability of a computer system to automatically configure expansion boards and other devices.

A plug and play device is a hardware that can be automatically configure with the computer without user's intervention, such devices do not need drivers.

Configuration

The way a system is set up, or the assortment of components that make up the system. Configuration can refer to either hardware or software, or the combination of both.

Many software products require that the computer have a certain minimum configuration.

For instance, a typical configuration for a PC consists of 32MB (megabytes) main memory, a floppy drive, a hard disk, a modem, a CD-ROM drive, aVGA monitor, and the Windows operating system.

Configuration can also refer to preferred hardware and Software (specific to a particular computing environment) will interact.

The devices that may be configured include:

The hard drive (disc) setting partitions.

The disc drives. The printers.

Monitors. To the desired display.

Installation: refers to the process of adding hardware components to the computer or activating software such that it works with the computer.

Software Installation: is the process of activating software such that it works

with a computer.

Hard ware installation: Refers to the process of adding hard ware components to the computer.eg disc drive, printer, camera

An installation program or installer is a computer program that installs files, such as applications, drivers, or other software, onto a computer.

Uninstaller utility software is a program that deactivates an application from the computer.

Program Files' is a standard folder in Microsoft Windows operating systems in which applications that are not part of the operating system are conventionally installed.

A **software suite** or **application suite** is a collection of computer programs — usually application software or programming software

In computers, a **suite** is a set of usually related programs sold together in a single package. Sometimes called "bundled **software**," **suites.**

Definition of **computing**: The process of utilizing computer technology to complete a task.

Computing definition, the use of a computer to process data or perform calculations.

Usenet is a worldwide distributed discussion system available on computers.

What is digital migration?

Digital Broadcasting Migration is a process in which broadcasting services offered on the traditional analog technology are replaced with digital based networks over a specific period. The transition or switch from analog television to digital television is referred to as the Digital Migration.

The digital divide refers to the difference between people who have easy access to the Internet and those who do not.

Encryption is the translation of data into a secret code. **Encryption** is the process of encoding messages or information in such a way that only authorized parties can read it.

Hacking is the process of exploiting vulnerabilities to gain unauthorized access to systems or resources.

Hacking is identifying and exploiting weaknesses in computer systems and/or computer networks.

The term "**cracking**" means trying to get into **computer** systems in order to steal, corrupt, or illegitimately view data.

Cracking also means gaining unauthorized access to computer systems to commit a crime, such as digging into the code to make a copy-protected program run and flooding Internet sites, thus denying service to legitimate users.

Software user interface

This is the visual part of a computer application or OS through which a user interacts with a computer or software.