

INFORMATION TECHNOLOGY

NOTES

BASED ON THE SYLLABUS

A COMPLETE COMPILATION FOR A'LEVEL

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INTRODUCTION TO COMPUTING CONTENT

1. The structure of Sub ICT UNEB a) 20 equally weighed compulsory papers structured & semi-structured

The structure of Sub ICT UNEB papers
Subsidiary ICT is composed of two papers

- a) Paper one which is theory
- b) Paper two which is practical

Sub ICT paper one (Theory) 2hrs 30 min

Paper one contributes 40%

Sub ICT paper two (practical) 2hrs

Contributes 60%.

- a) Composed of 5 equally weighed optional practical questions derived from;
- b) Electronic Word processing
- c) Spread sheet
- d) Electronic publication
- e) Database & Electronic Presentation

Candidate selects only three question.

Where applicable, Support files will be provided to supplement questions.

INTRODUCTION TO COMPUTERS

A computer is an electronic programmable device that can accept data as input, processes it according to instructions, output the information and store the results for future use.

Explanation of key terms

Electronic: A computer works in presence of electricity.

Programmable: A computer can work depending on the instructions installed in it.

Data: Raw facts & figures entered into a computer for processing.

Input: refers to data

Process: Turning raw facts into information.

Information: Refers to processed data

Storage: The process of keeping information for future use.

Characteristics of modern computers

1. **High Speed:** Computer can perform millions of instructions in a single second.
2. **High level of Accuracy:** Computers have the ability to perform a given task without mistakes. If right data is entered into the computer, right results are given out. They work on a principle of GIGO.
3. **Diligence:** computers can work on the same task for a long period of time without getting tired, getting bored or losing concentration.

4. **Versatility:** computers have the capability to perform completely different type of work at the same time (multitasking, multi programmable).
5. **Memory:** The Computer has an in-built memory where it stores large amount of data during processing
6. **Automation and programmability:** Computers receive and work on instruction on their own. They work on minimal human intervention.
7. **Large storage Capacity:** Computers are capable holding large amounts of data for long time without losing it through their storage media like; HDD, CDs, flash disks, DVDs, etc.
8. **Artificial intelligence (AI):**

Computers have the ability to mimic human thought. Programmed Computers can receive and respond to requests, and give the appropriate response.

Modes of acquiring computers

1. Direct purchase of a computer
2. Renting of a computer
3. Hiring a computer
4. Lease of a computer. - grant (property) on lease

PARTS OF THE COMPUTER

A computer is composed of the following main parts.

1. Monitor
2. System case/ system unit
3. Key board
4. Mouse
5. Speakers

FUNCTIONS OF EACH PART OF THE COMPUTER

1. Monitor:

This is an output device used to display processed information in visual form using text, graphics and videos.

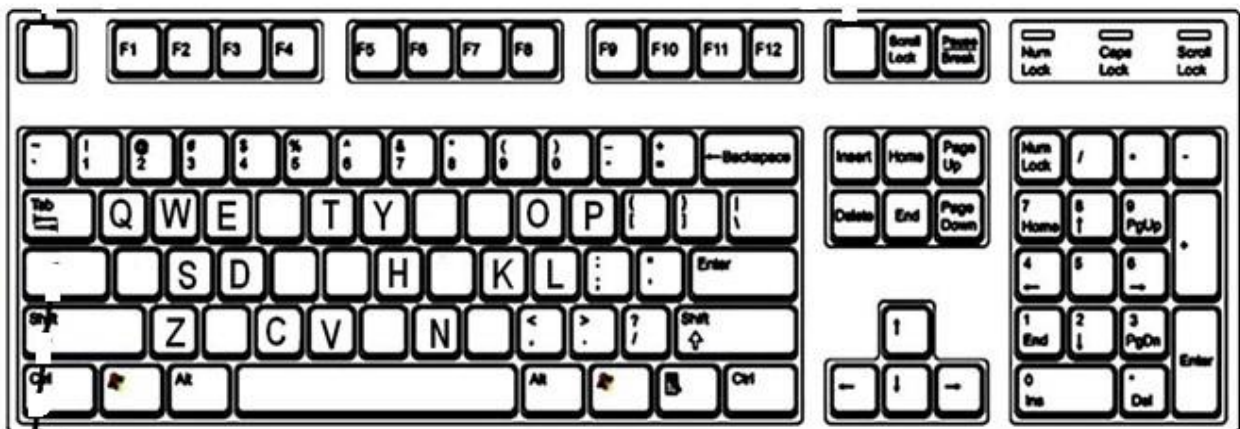


2. System case:

This is a rectangular box that stores many electronic internal components that process information for the computer.

3. Key board.

This is an input device used mainly for typing text into the computer.



4. Mouse:

This is an input device used to point and to select items on the computer screen.



5. **Speakers:**

These are output devices used to produce sound



CONNECTING VARIOUS COMPUTER PARTS TOGETHER

If all the computer parts are disconnected, they can be connected together to form a **computer system** so as to accomplish a task as follows.

1. Connect a keyboard, mouse & a VGA cable from the monitor to the System unit.
2. Then connect the power cable of monitor to the power source & then that of the System unit.
3. Then boot the computer.

THE COMPUTER SYSTEM

A computer system is a group of interconnected parts working together to complete a given task.

Components of the computer system

1. Hardware
2. Software
3. Human ware
4. Communication
5. Data

Hardware

This refers to the physical and tangible components of a computer. **Hardware** comprises the electronic & the electromechanical parts of the computer.

Used to input data, process, store and output Information

Categories of computer hardware

1. Input hardware
2. Processing hardware
3. Storage hardware
4. Output hardware
5. Communications hardware

Examples of hardware devices

1. Monitor keyboard,
2. mouse,
3. CPU
4. Printer , Router etc.

Software

This refers to the electronic instructions that tell the computer how to perform a task.

Software refers to the set of programs that control and manage the operations of the computer.

Categories of computer software:

- a) System software
- b) Application software Examples of computer

software a) **System software e.g.**

1. Operating system e.g. windows 8, Linux, DOS
2. Utility programs e.g. Antivirus, Screen savers,
3. Programming languages e.g. ADA, Pascal, FORTRAN

b) **Application software e.g.**

1. Word processor
2. Database
3. Presentation software etc.

3. Human ware

Human ware is also referred to as live ware or User

Human ware refers to the people who operate and initialize instructions to the computer

Human ware is the most important component of the computer system used to design and develop computer systems, operate the computer hardware, create the software, and establish procedures for carrying out tasks.

Categories of human ware

1. Ordinary user
2. Professional user

1. Ordinary user

This is a person who uses a computer but without formal education in the technical use of computers.

2. Professional user

This a person in a profession involving computers who has had formal education in the technical aspects of computers e.g. a Computer programmer

Examples of computer Professional users

1. Computer programmer
2. System analyst
3. System administrator
4. Database administrator 5. Network administrator.

Communication

This is the process of transferring data between computer systems or devices.

Categories

Communication through computer networks:

- | | |
|-------------|--------------|
| 1. Internet | 4. Intranets |
| 2. LAN | 5. WAN |
| 3. MAN | 6. PAN, etc. |

Examples of networking devices

1. Cables / communication media
2. Modems
3. Routers
4. Gateways

Data & information

This refers to raw facts and figures that are entered into the computer for processing.

Categories of data

- 1) Unproved data
- 2) Information

Unprocessed data. These are the raw facts & figures which are meaningless to the final user.

Examples; Letters & symbols. (e.g., a, b, c, & ...), words Numbers/digits, Sound, Musical notes, graphics **Information.**

This refers to processed data which conveys meaning to the final user. E.g.

- | | |
|------------------|----------------------------|
| 1. A document | 5. A mathematical formula, |
| 2. A report card | 6. A song |
| 3. Dates | 7. A Video, |
| 4. A news paper | |

QUALITIES OF GOOD INFORMATION

1. It should be complete
2. It should be clear
3. It should be relevant to its purpose
4. It should be got in time
5. It should be accurate

THE INFORMATION PROCESSING CYCLE

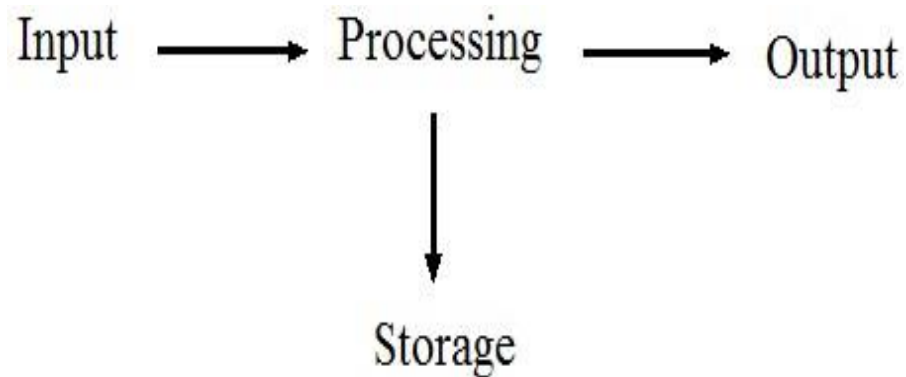
Also Called **data processing cycle** refers to the stages data undergoes to be turned into information.

It refers to the steps/ stages followed in turning data into information.

The four major stages involved in this cycle are;

- a) Input,
- b) Processing,
- c) Output, and
- d) Storage.

Stages involved in the Information processing cycle



Operations involved at each stage

At input stage, data is collected and then entered in the computer using input devices such as key board, scanner, and etc.

At processing stage, the data is turned into information by the processor / CPU

At output stage, processed data is displayed to the user using devices like the printer & monitors.

At storage stage, information is kept on a storage device e.g. flash disk, CD and other for future use or reference.

The information from the storage device can be fed into the system for further processing.

WORLD OF ICTs

ICT stands for Information and Communication Technology.

ICT is the combination of telecommunication technology such as satellite, internet, network hardware and software etc. and computing technologies e.g. computers, cell phones, radios televisions etc. to enhance communication.

Examples of old technologies before the coming of ICTS

- a) News papers
- b) Films
- c) Radios
- d) Paper printed photograph
- e) Television

Examples of new technologies after the coming of ICT

- | | |
|-----------------------|---------------------------------|
| a) Satellite | e) Internet |
| b) e-mail | f) fax machines |
| c) video conferencing | g) optical disks (CDS AND DVDS) |
| d) cellular phone | h) Fibre optic cables |

WHY IS ICT TAUGHT AS A SUBJECT?

- i. To help learners develop & consolidate their knowledge of ICT & be aware of new & emerging technology
- ii. To encourage learners to develop as independent user.
- iii. To encourage learners to develop ICT skills to enhance work productivity in a variety of subject area
- iv. To empower learners and prepare them for lifelong learning.

APPLICATION OF ICTS

ICT has been practically applied in various sectors i.e.;

- a) Homes, Business
- b) Education and training institutes
- c) Health
- d) Security
- e) Transport and communication
- f) Entertainment and leisure
- g) Industrial sector
- h) Computer modelling
- i) science

1. APPLICATION OF ICT AT HOME

At home, computers are used to / for;

- 1. Entertainment & leisure activities (playing online games)
- 2. To communicate with friends through emails & social sites.
- 3. Pay bills through payment by phone services
- 4. Budgeting and personal financial management
- 5. Buy and sell stocks online.

2. APPLICATION OF COMPUTERS IN EDUCATION

In schools, computers are used for based training which include;

1. Computer Assisted Instruction (CAI) where teachers use computers to present teaching materials in a more interesting way.
2. Computer Assisted Learning (CAL). Students can use computers & appropriate software to learn at their own pace.
3. Computer Assisted Assessment (CAA). Which may reduce time and labour to mark answer scripts.

APPLICATION OF COMPUTERS IN EDUCATION

In education, computers are used for,

4. Distance learning through computer based training
5. Simulation for experiments or real life situations which may be hazardous.
6. Electronic library system for searching, borrowing and returning books
7. The school administration & management systems (SAMS) for keeping records of students and producing report cards or other related documents
- Application of computers in education.
9. Making Error free school time tables can be made using special time table computer software.
10. Fees payment. ICT's such as mobile phones using mobile money can be used for paying school fees.

Examples of ICT tools used schools

- | | |
|-------------------|-----------------|
| 1. Computers | 4. Projectors |
| 2. Printers | 5. Photocopiers |
| 3. Digital camera | 6. Modems |

Advantages of using it in teaching & learning

1. Teachers can present subject matter & explain difficult concepts more clearly with multimedia.
2. Teachers can demonstrate dangerous experiments through simulation software
3. Students learn by themselves when the teacher is absent
4. Students can get their results & feedback immediately after they have answered qn.
5. CAI & CAL packages that contain multimedia packages make learning more interesting & interactive.

Disadvantages of using it in teaching & learning

1. Face to face interactions between students & teachers may be reduced.
2. Students can only follow what CAL packages are designed to offer
- 3.** In absence of electricity teaching & learning cannot take place.
 - 3. Application of it in offices, computers are used for / to;
 1. Create memos, letters & reports.
 2. Calculate payroll, prepare income statements & balance sheets
 3. Track inventory & generate invoices and receipts.
 4. Present projects & ideas by means of presentation software
 5. Use facsimile, e-mail, electronic bulletin & video conferences.
 6. Create websites to provide information, advertise products & services and conduct e-commerce

4. APPLICATION OF ICT IN BANKS

Automatic teller machine (ATM): This is a self-service machine attached to a host computer through telephone network used for online business activities.

Services available through ATM

1. Withdraw cash
2. Deposit cash
3. Check for account balances

4. Online banking
5. Transfer money between different accounts
6. Download monthly transaction information etc

ELECTRONIC COMMERCE

This is a financial business transaction that occurs over a network (internet). E.g. Online shopping and banking.

E- money is a mean of paying for a good and service over the internet.

A set of standards that control the transfer of business data & information among computers both within and among companies is called Electronic Data Interchange (EDI).

Models of e- commerce

- 1) Business to consumer (B2C): This is a business transaction that occur over the internet where a business sells goods to general public.
- 2) Consumer to consumer (C2C): This is where one consumer sells directly to another consumer.
- 3) Business to business (B2B): This is where a business provides services & goods to another business

Advantages of e-commerce

1. Transactions can occur immediately & globally thus saves time for participants on both ends
2. Transactions can occur 24 hrs per day
3. Information can be changed and be availed quickly.
4. Consumers can compare prices easily.
5. Manufactures can sell directly to consumers hence eliminating middlemen and their effects

APPLICATION OF IT IN LEISURE & ENTERTAINMENT

In leisure and entertainment, computers are used to;

- | | |
|------------------------|------------------------------|
| 1. Play computer games | 4. Compose and edit a video |
| 2. Listen to music | 5. Read a book or a magazine |

3. Watch a movie online
6. Plan a vacation

APPLICATION OF ICT IN INDUSTRIES

1. Computer Aided Design: used for creating engineering, architectural & scientific drawings.
2. Computer aided manufacturing: to manufacture 3-D objects
3. Robotics. A robot is a computer-controlled device that can move & react to feedback from outside world.

Robots are used for jobs that require;

- a) Repetitive tasks
- b) Lifting heavy equipment
- c) High degree of precision

APPLICATION OF ICT IN HEALTH SECTOR

In hospitals, computers are used for/ to;

1. Scanning operations
2. Drug mixing & prescription
3. Keep patient records
4. Monitor patients' vital signs
5. Carrying out Computer- assisted medical tests
6. Carrying out sensitive operations on sensitive body parts like the brain, heart & kidney.
7. Research and diagnose medical conditions
8. Implant computerized devices e.g. (pacemakers) that allow the patient to live longer.
9. Use computer-controlled devices during operations that require great precision e.g. laser eye surgery & heart surgery).

IMPLICATION OF USING ICT

Advantages

- 1) Increased access and sharing of databases within and outside the organization through networking.
- 2) Increased interactions and collaborations through e mails, chat rooms, videoconferencing etc
- 3) Improved access to education through videoconferencing, internet use of simulations and animations
- 4) Creation of jobs such as mobile money service provision, ICT technicians.
- 5) Increased access to shared information which in turn simplifies research.
- 6) Increased inventions and innovations such as the wireless key board, mouse, touch screens
- 7) Increased efficiency and effectiveness leading to increased productivity hence less wastage of resources.

Disadvantages

1. Widens the gap between information rich and poor. (Digital divide)
2. Isolates the old people since they do not find it easy to learn and use the ICT gadgets very fast.
3. Reduced physical activity
4. Erosion of individual privacy
5. Un employment
6. Addiction to computers
7. Increased computer crimes such as hacking, phishing, software piracy etc.
8. They are both health & environmental hazards i.e. cause eye defects.

NOTE. The environmental impact of computers can be mitigated by carrying out Green Computing

GREEN COMPUTING

This refers to the use of computers in a way which has less negative impact on the environment.

It is the use of computers in an environmentally friendly way. **The goals of green computing**

1. To reduce the use of dangerous materials
2. To maximize energy efficiency during the product's life time
3. To promote the recyclability / biodegradability of outdated products & factory wastes.

WAYS THROUGH WHICH GREEN COMPUTING CAN BE PRACTICED

- 1) Use LCD monitors, instead of cathode ray tube (CRT) monitors.
- 2) Use the hibernate or sleep mode when away from a computer for extended periods
- 3) Buy energy efficient notebook computers, instead of desktop computers.
- 4) Activate the power management features for controlling energy consumption
- 5) Dispose off electronic wastes properly.
6. Turn off computers at the end of each day
7. Refill printer cartridges, rather than buying new ones.
8. Instead of purchasing a new computer, try repairing existing device.
9. Dispose of e-waste according to federal, state and local regulations.
10. Power-up and power-down energy-intensive peripherals such as laser printers according to need.

To promote green computing concepts at all possible levels, the following four complementary approaches are employed:

- **Green use:** Minimizing the electricity consumption of computers and their peripheral devices and using them in an eco-friendly manner
- **Green disposal:** Re-purposing an existing computer or appropriately disposing of, or recycling, unwanted electronic equipment
- **Green design:** Designing energy-efficient computers, servers, printers, projectors and other digital devices

- **Green manufacturing:** Minimizing waste during the manufacturing of computers and other subsystems to reduce the environmental impact of these activities

Government regulatory authorities also actively work to promote green computing concepts by introducing several voluntary programs and regulations for their enforcement.

Average computer users can employ the following general tactics to make their computing usage more green:

- Use the hibernate or sleep mode when away from a computer for extended periods
- Use flat-screen or LCD monitors, instead of conventional cathode ray tube (CRT) monitors
- Buy energy efficient notebook computers, instead of desktop computers
- Activate the power management features for controlling energy consumption
- Make proper arrangements for safe electronic waste disposal
- Turn off computers at the end of each day
- Refill printer cartridges, rather than buying new ones
- Instead of purchasing a new computer, try refurbishing an existing device

Advantages and

Disadvantages of Green Computing

Advantages:

- Energy saving
- Environmentally Friendly
- Cost-effective (pays over time)
- Save more money per year - can give you a tax right off

Disadvantages:

- High start up cost
- Not readily available
- Still in experimental stages
- Sacrifice performance for battery life
- Not for everyone

CONCEPT OF CLOUD COMPUTING

Cloud computing refers to the use and access of multiple server-based computational resources via a digital network like WAN, internet connection like WWW etc.

Cloud users may access the server resources using a computer, notebook, smart phone or any other device. In cloud computing, applications are provided and managed by the cloud server and data is also stored remotely in the cloud configuration.

ADVANTAGES OF CLOUD COMPUTING

Cost Efficiency

This is the biggest advantage of cloud computing, achieved by the elimination of the investment in stand-alone software or servers. By cloud computing, companies can save on licensing fees and at the same time eliminate overhead charges such as the cost of data storage, software updates, management etc.

Convenience and continuous availability

Public clouds offer services that are available wherever the end user might be located. This approach enables easy access to information and accommodates the needs of users in different time zones and geographic locations. As a side benefit, collaboration booms since it is now easier than ever to access, view and modify shared documents and files.

Backup and Recovery

The process of backing up and recovering data is simplified since those now reside on the cloud and not on a physical device. The various cloud providers offer reliable and flexible backup/recovery solutions.

Cloud is environmentally friendly

The cloud is in general more efficient than the typical IT infrastructure and it takes fewer resources to compute, thus saving energy. For example, when servers are not used, the infrastructure normally scales down, freeing up resources and consuming less power.

Scalability and Performance

Scalability is a built-in feature for cloud deployments. Cloud instances are deployed automatically only when needed and as a result, you pay only for the applications and data storage you need.

Quick deployment and ease of integration

A cloud system can be up and running in a very short period, making quick deployment a key benefit. On the same aspect, the introduction of a new user in the system happens instantaneously, eliminating waiting periods.

Furthermore, software integration occurs automatically and organically in cloud installations. A business is allowed to choose the services and applications that best suit their preferences, while there is minimum effort in customizing and integrating those applications.

Increased Storage Capacity

The cloud can accommodate and store much more data compared to a personal computer and in a way offers almost unlimited storage capacity. It eliminates worries about running out of storage space and at the same time it spares businesses the need to upgrade their computer hardware, further reducing the overall IT cost.

Smaller learning curve

Cloud applications usually entail smaller learning curves since people are quickly used to them. Users find it easier to adopt them and come up to speed much faster. Main examples of this are applications like Gmail and Google Docs.

DISADVANTAGES OF CLOUD COMPUTING

Security and privacy in the Cloud

Security is the biggest concern when it comes to cloud computing. By using a remote cloud based infrastructure, a company essentially gives away private data and information, things that might be sensitive and confidential. It is then up to the cloud service provider to manage, protect and retain them, thus the provider's reliability is very critical.

Similarly, privacy in the cloud is another huge issue. Companies and users have to trust their cloud service vendors that they will protect their data from unauthorized users. The various stories of data loss and password leakage in the media does not help to reassure some of the most concerned users.

Dependency and vendor lock-in (Data migration problem when changing the cloud provider)

One of the major disadvantages of cloud computing is the implicit dependency on the provider. This is what the industry calls "vendor lock-in" since it is difficult, and sometimes impossible, to migrate from a provider once you have rolled with him. If a user wishes to switch to some other provider, then it can be really painful and cumbersome to transfer huge data from the old provider to the new one. This is another reason why you should carefully and thoroughly contemplate all options when picking a vendor.

Limited control and flexibility

Since the applications and services run on remote, third party virtual environments, companies and users have limited control over the function and execution of the hardware and software. Moreover, since remote software is being used, it usually lacks the features of an application running locally.

Increased Vulnerability

Related to the security and privacy mentioned before, note that cloud based solutions are exposed on the public internet and are thus a more vulnerable target for malicious users and hackers. Nothing on the Internet is completely secure and even the biggest players suffer from serious attacks and security breaches.

REVISION QUESTIONS 1.

What is a computer?

b) Explain the characteristics of modern computers

2. Describe how the various parts of the computer can be connected to form a system

b) What is a computer system?

c) Outline the components of the computer system & write short notes on each component

3. Distinguish between data & information

b) What do you understand by the information processing cycle?

c) Describe the steps involved in the information processing cycle.

d) Outline the qualities of information.

4. What is ICT?

b) Outline the examples of ICTs commonly used today.

5. Explain how ICT is used in the following sectors

a) Banks

d) Hospitals

b) School

c) Entertainment etc

b) Give the positive & negative impacts of ICT on society

6. What is green computing?
- b) Outline the various ways by which green computing can be practiced.

COMPUTER MANAGEMENT CONTENT

1. Booting Process

- a) Booting of a computer
- b) Computer program

2. File management

- a) Creating Folders
- b) Desktop Icons

3. Common utilities

- a) Functions of each utility program

4. Print management

- a) Printing a document

TERMINOLOGIES

- **File:** a piece of information created by any computer software or program e.g. a document, a photo etc.
- **Folder:** is the virtual storage area of your files, programs etc. on the computer
- **Briefcase:** is the virtual storage area which would hold your files, programs etc. on the computer and allows synchronization across devices and other computers.
- **Icons:** small graphic images or pictures that represent files, programs or a command.
- **Computer literacy:** refers to the knowledge and ability to use computer technology efficiently.

BOOTING PROCESS

Booting is the process of starting a computer.

Types of computer booting

1) Cold booting

2) Warm booting

1) **Cold booting** is the initial process of turning on a computer after it has been powered off completely.

The steps involved in a cold boot

Warm booting: This is the process of restarting a computer which is already on.

It is also called soft boot.

A warm boot can be accomplished by pressing by either clicking the restart button or by pressing Ctrl + Alt + Delete keys simultaneously.

Starting a computer...

Steps involved in a cold boot.

- Switch on the main power source (i.e. socket)
- Switch on the uninterruptible power supply
- Switch on the system unit
- Finally switch on the monitor
- Power on self test is conducted by the BIO
- Bootstrap loads the OS into RAM
- The desktop is activated

CONDITIONS WHICH NECESSITATE A WARM BOOT

- 1) When the computer locks or freezes
- 2) When a computer slows down
- 3) After installing a new software program.
- 4) After uninstalling software program

- 5) After installing a new hardware device like a printer.
- 6) After changing CMOS or BIOS setup

b) Computer program

A computer program is a set of instruction that govern the operation of a computer

Ways of starting a computer program

1. Click start button, all programs, and choose the program name on the all program list that appears
2. Double click a program's icon on the desktop.
3. Click any program icon displayed on the task bar

SHUTTING DOWN THE COMPUTER

To properly shut down the computer,

- a) Save all you are doing,
- b) Close all the running program/ active windows.
- c) Click on the start button
- d) Click turn off computer
- e) Click turn off / shut down

FILE MANAGEMENT

- File management refers to the fundamental methods for naming, storing and handling files.
- A file is a collection of related data stored under the same name called the filename.
- Any document is stored as a file by the computer.
- Each file name has two parts namely; The **file name** and the **file extension**

FILE EXTENSIONS

A **file extension** is the end part of a file name that is separated by a dot, containing characters based on the program used to create the file

A file extension helps the computer user to; 1)

Identify the file type.

- 2) Easily locate files.
- 3) Identify what program to associate the file with and how to properly open it using the correct program.

COMMON FILE EXTENSIONS & THEIR ASSOCIATED PROGRAMS

Associated program	File extension
Microsoft word	.doc or .docx
Microsoft Excel	.xls or .xlsx
Photo	.jpeg
Microsoft PowerPoint	.ppt or .pptx
Associated program	File extension
Microsoft Access	.dbm or .dbmx
Image	.bpm
System files	.sys
Microsoft Windows Movie file	.AVI
Web page files	.html

Folders

A folder is a collection of files and other sub folders stored in a same location.

How to create a folder;

- Right click any blank space on desktop.
- Select new.
- Select folder.
- Type set folder name
- Press enter key from the key board.

To delete a folder

- Right click on the folder to be delete
- From the menu select delete
- The computer will prompt you that are you sure you want to delete this folder.
- Click Yes to delete.

To move a folder to the desired location

- o Select the folder to be moved
- o Hold down the mouse
- o Move or drag to the desired position

Desktop icons

- My Computer / This PC
- My Documents
- Recycle Bin
- Network Places
- Control Panel
- User profile

COMMON UTILITIES

These are general purpose programs that enhance/ boost the performance of a computer.

They are designed to configure, analyse, optimise, and maintain a computer in a normal working state. Some utility programs are included with the operating system (for example, disk repairing programs) while others are purchased separately by the user (for example, Norton Disk Doctor).

Examples of utility programs

- | | |
|-----------------------------|----------------------------------|
| a) Sorting utility | i) Un installer |
| b) Merging utility | j) Disk defragmenter |
| c) Back up utility | j) Disk repair utility |
| d) Antivirus utility | k) Computer language translators |
| e) Data compression utility | l) Disk partitioning software |
| f) Screen savers | m) Disk compression utilities |
| g) Scandisk utility | n) File managers |
| h) File viewer | o) Diagnostic utility. |

Functions of each utility program

- 1) File Viewer:** This is a utility that displays the content of a file.
- 2) File /data compression utility.** Used to squeeze large files so that they can require less storage space
- 3) Sorting utility:** This is used to take in data and arrange it as specified by the user.
- 6) Compression utility:** reduces the size of files to free disk space
- 7) Merging utility:** This combines data from two or more files to form one general file
- 8) Antivirus utility:** This prevents, detects and removes viruses.
- 9) Uninstaller utility:** This removes programs.
- 10) Folder management utility:** This is used for creating, viewing, deleting and rearranging files and folders
- 9) Disk Defragmenter:** finds fragmented files on the hard disk and organises them in a contiguous manner.
- 10) Diagnostic utility** Compiles technical computer information & helps outline any identified problems

11) System profilers

Provide detailed information about the software installed and hardware attached to the computer.

Backup utility: Makes a duplicate copy of every file on the hard disk which can be store on the CD or floppy

Antivirus utility: This Prevents, detects and removes viruses Examples of anti-virus utility

- 1) Avira
- 2) Kaspersky
- 3) AVG
- 4) Smadave

14) Network utilities: Analyses the computer's network connectivity, configure network settings, check data transfer and log events.

15) Scandisk:

Scans the computer disk to see if there is any potential problem such as bad disk areas, and possibly repair them.

Cryptographic utilities: Used to encrypt and decrypt files.

Screen saver utility: Causes the computer monitor to automatically displays a moving image (graphic) after a period when no input device is in use.

Originally, Screen saver utility was introduced to prevent phosphor burn-in (ghosting effect) of computer monitors.

Screen savers have Practical uses to a computer user which include;

1. Entertainment
2. Security
3. Advertisement
4. Information

PRINT MANAGEMENT

In order to print a document, a printer must be attached to the computer.

Before one prints a file, it should be previewed.

Print preview means to look at the document before it is printed out so as to identify missing content

To print preview a file,

- Click on file (click on the office button in the top most left corner of the window)
- Point at print
- Click print preview
- To print
- Click file (office button)
- Click print to open the print dialogue box
- Select the printer to be used on the box labeled name e.g. hp laser jet professional 1606dn
- Click properties to specify the paper type e.g. A4
- Specify the number of copies to be printed
- Specify the number of copies to be printed
- Select the range of pages to print by clicking on either all to print the entire document or current to print the displayed page or selection to print a selected area.
- Click ok to print a document. Shortcut: Ctrl + P

COMPUTER LABORATORY CARE & MANAGEMENT



Content

- 1. Introduction**
- 2. Computer literacy**
- 3. Secure laboratory environment**
 - a) Areas of laboratory security
 - b) Safe use of the computer laboratory
 - c) Laboratory Rules & regulations
- 4. Servicing & maintenance of a computer**
 - a) Importance of servicing a computer
 - b) Trouble shooting a computer
 - c) Introduction

Computer laboratory management refers to taking proper care of all hardware & software installation in the computer laboratory.

Computers need special care & attention in order to perform properly and safely.

This is done through observation of computer ethics integrity.

Computer ethics are the human values & moral conducts for the computer users.

It is also referred to as the right or wrong behavior exercised when using the computers.

Computer integrity refers to the loyalty/ faithfulness to the principled set of laws regarding computer use.

Computer literacy

This refers to the knowledge and ability to use computer technology efficiently.

Computer literacy also refers to having knowledge & understanding of computers & their uses.

Computer literacy involves having both the **basic skills & intermediate skills. Basic skills include;**

1. Ability to start / switch on a computer (boot)
2. Ability to use the mouse & interact with screen objects
3. Being able to use the computer key board
4. Ability to open & locate files
5. Ability to shut down a computer properly. etc

Intermediate skills include;

1. Functional knowledge of word processing
2. Functional knowledge of spreadsheets
3. Functional knowledge of presentation software.
4. Ability to use the email
5. Ability to use the internet
6. Ability to install and uninstall software.

• Secure laboratory environment

A computer laboratory is a special room where computers are kept for safe use.

It is a special room in a school where computer practical lessons are carried out from.

A secure laboratory environment refers to a laboratory which is safe to the computers, the data & software as well as the individuals working with the computers.

LAB EQUIPMENTS AND TOOLS

- | | |
|--------------------------------------|---|
| a) Air conditioner (AC) | k) CCTV Camera (closed circuit television camera) |
| b) Woolen carpet | l) Mouse Pads |
| c) Dust blower | m) Bugler proofing |
| d) A gaseous fire extinguisher | n) Toolkit |
| e) Surge protector. | o) Water proof covers |
| f) curtain | p) Dust covers |
| g) Routers, gate ways, switches etc. | q) Anti-glare filters |
| h) Lightening conductor | |

- a) **Air conditioner:** Regulates room temperature
- b) **Bugler proofing:** Prevents un authorized access in the computer laboratory.
- c) **Woolen carpet:** Absorbs dust & Shock.
- d) **Toolkit:** Used to store necessary tools required for computer maintenance.
- e) **Dust blower:** Used to blow off dust from system unit components.
- f) **Routers, modems gateways:** connect the computers to the network.

- g) **A gaseous fire extinguisher:** To prevent fire from spreading in case of a power outbreak.
- h) **Surge protector:** This is an appliance that protects computers from voltage spikes.
- i) **Curtains:** These protect computers from direct sunlight.
- j) **Water proof covers:** Safeguards computer hardware from contact with water & moisture
- k) **Lightening conductor:** prevent lightening from striking the computers.
- l) **CCTV camera** (closed circuit television camera): Monitor security of the laboratory.
- m) **Mouse pads:** allows proper movement of the mouse as well as preventing dust from entering the mouse sensor.
- n) **Dust covers:** these are pieces of clothes covered on the computers after use to prevent dust.
- o) **Anti-glare filters:** these are covered onto the monitors to reduce on the effect of bright light onto the retina.

AREAS OF LABORATORY SECURITY

1. Physical security
2. Electronic power security
3. Security cameras
4. Software based security
5. First aid boxes 6. Fire extinguishers 7. Air-conditioning.

Physical security

This involves all activities done to eliminate the physical access by un authorized people into the computer laboratory.

Ways of ensuring Physical security

1. Burglar proofing the lab.
2. Locking the laboratory with a strong lock
3. Employing a security personnel
4. Backing up information both onsite & offsite

5. Installing an alarm security system
6. Limiting access to computer ports

Electronic power security:

Unstable electric power supply can lead to damaging of electric equipments.

To prevent damage due to electricity;

- 1) Use of surge protectors
- 2) Use of uninterruptible power supply
- 3) Providing a standby generator
- 4) Use of good quality strong cables to connect computers.

Software based security

This involves all activities done to prevent computer software from being damaged by viruses and accessed illegally by hackers.

This can be done by;

- a) Installing a strong Antivirus
- b) Installing Anti spy ware
- c) Installing Firewalls
- d) Creating passwords
- e) Separating users accounts
- f) Software updating and upgrading

Fire outbreak

To prevent fire from catching other equipment, the following should be place in a computer lab;

- 1) Fire extinguishers
- 2) Smoke detectors

- 3) First aid boxes
- 4) Air-conditioning.

CAUSES OF FIRE OUTBREAK IN A COMPUTER LABORATORY

- 1) Short circuits due to Poor wiring of electric cables
- 2) Unstable power supply
- 3) Pouring water onto the electric sockets 4) Poor quality power cables.
- 5) Thunder strike / lightening
- 6) Unnecessary moving of equipment in the laboratory.

WAYS BY WHICH FIRE ACCIDENTS CAN BE PREVENTED LABORATORY

- a) By proper wiring of electric cables to prevent short circuits
- b) By Installing power surge protectors such as UPS
- c) By Installing a lightening conductor on the laboratory
- d) By avoiding food and water in the computer laboratory
- e) Avoid using computers during heavy rains.

Data risks in the computer laboratory

- 1) Data theft
- 2) Virus attack
- 3) Erroneous deletion of files
- 4) Failure to save files
- 5) Information theft and piracy 6) Cracking of software.
- 7) Damaging of the storage media

Ways of safeguarding data in a computer lab

1. Protecting files with a password
2. Backing up of data.
3. Separating users accounts on the computer
4. Installing a strong antivirus software.
5. Scanning all storage media before opening them

SAFE USE OF THE COMPUTER LABORATORY.

How can a computer lab be safely used?

1. Plug all computer equipments into a surge protector to avoid power spikes and surges in electrical power which can damage the electrical equipments.
2. Set up a network layer firewall.
3. Setup weekly updates or weekly updates
4. Install an up-to-date anti-virus software.
5. Back up your computers on regular basis.
6. Use the hard disc clean up and defragmentation utilities regularly.
7. Dust the computer screens regularly with a thin soft microfiber cloth
8. Clean the computer lab regularly

LABORATORY RULES & REGULATIONS

1. Computers should be kept in a dust free environment.
2. Do not bring any food or drink into the computer lab
3. Do not open external storage media such as flash discs, and memory cards before scanning them for viruses.
4. Do not run or rush while in a computer lab.
5. Do not touch any exposed wire of socket
6. Do not bring any magnetic devices into the laboratory.

7. Always sit upright while using the computers to avoid back ache and muscle pain due to poor sitting posture.

SERVICING & MAINTENANCE OF A COMPUTER

Computer maintenance refers to the special care & attention given to computers in order to perform properly and safely

In order to keep computers in a good working condition, they should be regularly serviced.

Servicing a computer involves;

1. Cleaning of the computer
2. Updating software
3. Upgrading software & hardware
4. Software installation
5. Fine turning on & off of the computer system

UPDATING SOFTWARE

Software updating refers to the Patching of the software that you have already installed.

Reasons for software updating

1. To ensure that a computer has the most up to date information possible
2. To keep the computer running efficiently
3. To put in place limitations & changes to the security of the product
- Software & hardware upgrading

Upgrading refers to the replacement of a product with the newer version of the same product.

Risks involved in software & hardware upgrading

1. Incompatibility of new hardware / software with other pieces of hardware in the system
2. The new version may contain bugs causing the program to malfunction
3. The new version may be not friendly to the user.

SOFTWARE INSTALLATION

This is the process of making a program ready for execution

Types of installation

1. Attended installation:
2. Silent installation:
3. Unintended installation
4. Headless installation
5. Clean installation
6. Network installation: (programs from a s

IMPORTANCE OF SERVICING A COMPUTER

1. To remove dust
2. To remove viruses
3. To update and upgrade software
4. To prolong the life of the computer
5. To remove and replace old and worn-out hardware components with new ones.

TROUBLE SHOOTING A COMPUTER

Trouble shooting refers to identifying a problem in a computer system and solving it.

The various trouble shooting technique used in computer management include; a) Use of diagnostic utility

- b) Scan disk utility
- c) Starting the computer from an external device

COMMON COMPUTER PROBLEMS

1. Power button fails to start the computer.
2. Application program running slowly

3. The computer runs slowly
4. Freezes of the computer
5. Failure of the sound to work
6. The mouse or key board stops working

TROUBLE SHOOTING TECHNIQUES FOR EACH PROBLEM

If the Power button fails to start the computer;

1. Check the power cable to find out that it is plugged into the main power source,
2. Check if the power source is working.
3. If you are using a laptop, make sure that the battery is charged; plug the AC adapter into the wall socket.

If Application program running is slowly;

1. Close & re-open the application
2. Up date the application from help menu or from online.

If the sound is not working;

1. Check the volume levels. Click the audio button (icon) at the right bottom corner of the screen to make sure that the sound is turned on and the volume is high.
2. Make sure that the sound drivers are installed and enabled.

If the Application programs are running slowly;

1. Run your virus scan
2. Delete any file or program you do not need to increase disk space
3. If you are using a PC, run the disk defragmenter

The mouse or key board stops working;

- 1) If you are using a wired key board or mouse, make sure that it is correctly plugged into system unit.
- 2) If you are using a wireless keyboard or mouse, make sure that it is turned on and its battery is charged.

Freezing /hanging up.

This is a situation where the computer becomes completely unresponsive to the commands.

When this happens, the user is unable to click anywhere on the screen, open or close any application or access shut down options.

If this happens;

1. Warm boot the computer by pressing Ctrl + Alt + delete keys simultaneously.

POSSIBLE CAUSES OF SYSTEM FREEZING

1. Overloading the machine with a lot of data and information.
2. Multitasking (running too many programs at the same time.
3. Virus attack
4. When the running program has encountered a problem.
5. High traffic in case of a networked system.
6. Low RAM
7. Aging hardware
8. Dust particles in the system unit
9. Installing incompatible software on the machine.
10. Corrupted operating system
11. Entering too many commands at the same time.

THE COMPUTER LABORATORY PERSONNEL

1. Computer technicians
2. Computer instructors
3. Programmer
4. Web masters
5. System administrators
6. Database administrator
7. System analyst

1. **Computer technicians:** Repairs the computer hardware & software.

Responsibilities of a computer technician

1. Troubleshooting computer hardware and software related problems.
2. Ensuring that all computer accessories such as printers, modems, storage media e.t.c are working properly.
3. Assembling and upgrading computers and their components.

ROLES PERFORMED BY EACH PERSONNEL

2. **Computer instructors / trainer:** This is a person employed to teach learners on how to use computers and other related devices

Responsibilities

1. Training people on how to use a computer & various application programs.
 2. Developing training reference materials.
 3. Guide learners on how to acquire knowledge through carrying out research.
 4. Advising learners on the best career opportunities in the broad field of ICT.
3. **Programmer:** this is a person who designs & creates computer software.

Responsibilities

1. Writes applications programs & system programs
2. Customize commercial application package to suite the organization needs.
3. Test, debug, install and maintain programs developed or customized for the organization.
4. **Web masters:** this is a person who designs, creates and maintains websites.

He is Responsible for;

1. Developing and testing websites.
2. Updating & modifying information on the websites to meet new demands by the users.
3. Monitoring the access & use of internet connection by enforcing security measures.
5. **Network administrators:** this is a person in charge of a computer network. He is responsible for installing, managing & controlling a network.
6. **Database administrator:** this is a person who manages, updates and supervises a company's database.
7. **System analyst:** The is a person responsible for analyzing a company's needs then designs & develops a computer based information system.

WORD PROCESSING 1

INTRODUCTION TO WORD PROCESSING (THEORY)

Word processing is the art of creating, saving, editing, formatting and printing text and graphic documents using electronic word processors.

Examples of word processors

These include:

-  Microsoft Word,
-  Corel WordPerfect,
-  Lotus WordPro,
-  Apple Pages,
-  OpenOffice.org Writer, etc.

NB: Text editors are simple word processors that are generally used to type without any special formatting.

Text editors are mainly used to create small notes, memos and programs.

Examples of common text editors

-  Notepad,
-  Notepad++,
-  Gedit etc.

PURPOSE OF WORD PROCESSING

Word processors are mostly used for writing letters, reports, projects, books, essays, memos, resumes (CVs) etc.

BASIC TERMINOLOGY

- **Typeface** A typeface is the shape of the characters. Some common typefaces are Times New Roman, Arial, and Tahoma.
- **Line Spacing** refers to the amount of vertical white space between two lines of text, from baseline to baseline. Line spacing is measured in points.
- **Text Alignment** refers to the way lines of text are arranged relative to the edges of a block of text. There are four types of alignment: left, centre, right, and justify.
- **Justification** is the process of aligning text in a document to both the left and right margins at the same time. Justified text may have extra spaces between letters within words, so that paragraphs appear as a block with an even right-margin ending.
- **Indent:** An indent is the amount of white space set in between the margin and the beginning of text. Examples of indents include the first line indent, hanging indent and right indent.
- **Formatting Text** Formatting text is the process of changing the appearance of text in a document. Formatting text involves using commands like bold, italics, underlining, changing font colour, etc.
- **Editing text:** This refers to the process of making changes to the content of an existing document. Editing text involves commands like cut and paste, overtype, undo, insert, and delete.
- **Copy** – To place selected text on the clipboard, without removing it from its current location.
- **Cut** – To remove selected text from its current position and place it on the clipboard.
- Copy and paste duplicated text, while Cut and paste moves text to a new location.
- **The clipboard** The Clipboard is an area of memory in which you can store copied or cut text, graphics or any other items temporarily before being pasted into other locations.
- The **paste special** feature helps to avoid pasting text with all its formatting. The paste special feature provides more control over what to paste.
- **Header** - The header refers to text that appears in the top margin of all pages in a document.
- **Footer** - The footer refers to text that appears in the bottom margin of all pages in a document.
- **Ruler** - You can use the ruler to set the indent, margin and tab markers. Avoid using the space bar to align text!
- **Tabs Stops** – tab stops are places where text can be made to line up. You can set a tab stop by clicking on the ruler bar at the desired position.
- **Hard Copy** – A copy of a document printed out on physical paper.
- **Soft Copy** – A copy of a document that is stored on a disk or other computer storage device.

- **Overtyping Mode** – Also called overwrite mode, causes any characters you type to replace ("overtyping") the characters at the cursor. You can switch between overtyping mode and insert mode by pressing the insert key.
- **Paragraph** – The text between one paragraph break and the next. A paragraph break is inserted by pressing Enter key.
- **Save** – To write the document's current state from RAM to a storage device.
- **Proofreading** is the process of reviewing a document to ensure the accuracy of its content. Proofreading tools include spelling and grammar check (F7), thesaurus, etc.

COMMON FEATURES OF WORD PROCESSING APPLICATIONS

1. **Word Wrap:** this feature automatically sends a word that does not fit within the margin settings onto the next line, without the user pressing Enter key.
2. **Find:** allows the user to locate all occurrences of a particular character, word or phrase.
3. **Replace:** allows the user to substitute existing characters, words or phrases with the new ones.
4. **Spell checker:** allows the user to check spellings of the whole document at one time or to check and even correct the spelling of individual words as they are typed (Autocorrect)
5. **Grammar checker:** this reports grammatical errors, usually by a wavy green line, and suggests ways to correct them.
6. **Thesaurus:** suggests alternative words with the same meaning (synonyms) for use in the document.
7. **Mail Merge:** This is feature used to create similar letters to be sent to several people. The names and addresses of each person can be merged with one single main document.
8. **Automatic page numbering:** numbers the pages automatically in a document
9. **Tables:** allow users to organise information into rows and columns.
10. **Multi-columns:** arranges text into two or more columns that look similar to newspaper or magazine
11. **Drop cap** – Formats the first letter in paragraph to be dropped across two or more lines.
12. **Clip art:** refers to pre-made images about various subjects used to illustrate concepts in documents.

13. **Templates:** establish the initial document layouts and formats for various document types.
14. **Printing:** allows a user to obtain a hard copy of a document from the printer.
15. **Word Count:** Establishes the number of words, characters, paragraphs, etc. in a document.
16. **Headers and Footers:** Used to insert text in the top and bottom margin through the document.
17. **Footnotes** and **Endnotes** are used as references that provide additional information about a word or phrase within a document.
18. **Insert** and **Delete** allows a user to add and remove portions of text while editing document

COMMON PARTS OF A WORD PROCESSOR

- a) **Title bar**—indicates the task currently running. On the right hand side of the title are the minimize, restore/minimize and close buttons
- b) **Menu bar**—provides the user with a group of commands that are used to manipulate the document
- c) **Tool bars**—consist of sets of command buttons for quick execution of frequently used groups of commands.
- d) **Document window**—this is the working area where the document is created
- e) **Status bar**—Displays information that the user may need to know such as the current position of the insertion point, progress, edit mode, etc.

ADVANTAGES OF USING ELECTRONIC WORD PROCESSORS AS COMPARED TO MANUAL TYPE WRITERS

Advantages:

1. Word processors can save softcopies for future use **while** with a type writer; a document has to be fully retyped if needed again.
2. During typing with a word processor, it is possible to undo a mistake, **while** any error made with a type writer is immediately impacted on the printout.
3. A type writer prints one character at a time **while** a word processor prints many pages at a time.
4. There is a variety of quick text formatting features such as bold, italic, underline, colour, etc. in a word processor **whereas** there are limited formatting options with a typewriter.
5. A word processor provides grammar and spell check options **whereas** a typewriter cannot help in spell checking.

6. It is easier to insert graphics and drawings in a word processor **yet** it is not easy to draw with a type writer.
7. A word processor allows the user to type continuously without pressing the enter key at the end of each line (word wrap) **whereas** the user needs to advance the lever of a typewriter manually, at the end of every line.
8. It is very simple to align text in a document to Left, Centre, Right or Justified **whereas** with a type writer, one has to manually align the text, which is very difficult.
9. A word processor has edit features such as Copy and Paste in which repeatedly occurring text in a document can be copied to and pasted from the clipboard **whereas** a type writer has no clipboard.
10. A word processor can work on many pages at a go by inserting page numbers, footers, headers, watermarks, etc. **whereas** a type writer works on one page at a time.
11. A word processor can insert drawings word arts and pictures **whereas** with a type writer, drawings and pictures can only be drawn by a hand on the stencil.
12. With A word processor, you can use mail merge feature to create a set of documents, such as a letter that is sent to many customers, by only creating one main document and inserting different fields for the customers' details **whereas** with a type writer, you have to type each document separately.
13. A type writer requires a lot of strength to strike a key so as to have a strong impact on the stencil in order to get a reasonably visible printout **whereas** a computer keyboard has easy-to-press buttons which don't require too much strength during typing.
14. A type writer makes a lot of noise during its operation as **compared** to a word processor which is relatively quiet.
15. A word processor has a lot of symbols such as Greek, Arabic, Latin, and Hebrew alphabet character sets **whereas** a type writer can only add the English alphabet and commonly used symbols that are currently calibrated on the typewriter.
16. A Word processor can add preformatted elements (templates) by selecting from a gallery of professional templates e.g. cover pages, resumes, etc. **whereas** with a type writer it is up to the typist to know the layout and professional look of document types.

NB: more points can still be generated basing on the features and operation of a word processor in comparison to a type writer

DISADVANTAGES OF USING ELECTRONIC WORD PROCESSORS

1. Word processors cannot be used without Electricity.
2. Word processors Use is Expensive due to the cost of computers.
3. They have led to Unemployment of typists because one person using a word processor can do a lot of work in a short time, which would be done by many using type writers.
4. Many people are Computer illiterate, and cannot use the program.
5. Computers have Viruses, which lead to loss of data in soft copies.
6. Using word processors on light emitting computer monitors for long leads to eye disorders, which isn't the case with type writers
7. Word processors require purchase of hard ware like printers in order to obtain hard copies yet with typewriters, whatever is typed is permanent and instantly available as a hard copy: there is no delay for printing or risk of unintended file deletion.

NB: It is this tangible writing experience free from computer meltdowns or deletions that is saving the typewriter from extinction.

COMMONLY USED WORD PROCESSING KEY BOARD SHORT CUTS

Ctrl-] or [Increase/ Reduce Font	Ctrl-Alt-C ©
Ctrl - Soft hyphen -	Ctrl-Alt-E Endnote
Ctrl = Subscript	Ctrl-Alt-F Footnote
Ctrl-0 Paragraph Space Above (add/delete 12 pt.)	Ctrl-Alt-I Print Preview
Ctrl-1 Line-spacing 1	Ctrl-Alt-K AutoFormat
Ctrl-2 Line-spacing 2	Ctrl-Alt-M Insert Comment
Ctrl-5 Line-spacing 1.5	Ctrl-Alt-N View—Normal
Ctrl-A Select All	Ctrl-Alt-O View—Outline
Ctrl-Alt-1 Heading Level 1	Ctrl-Alt-P View—Page
Ctrl-Alt-2 Heading Level 2	Ctrl-Alt-R ®
Ctrl-Alt-3 Heading Level 3	Ctrl-Alt-S Split a window

Ctrl-Alt-T TM

Ctrl-Alt-U Table—remove border lines
Ctrl-Alt-Y Repeat Find
Ctrl-Alt-Z Go Back (3 max)
Ctrl-B Bold
Ctrl-C Copy
Ctrl-click Select Sentence
Ctrl-D Font Dialog
Ctrl-drag Drawing—draw from center
Ctrl-E Align—Center
Ctrl-Enter Break—page
Ctrl-F Find
Ctrl-F10 Maximize window
Ctrl-F4 Close
Ctrl-F5 Document window—restore
Ctrl-F7 Document window—move
Ctrl-F8 Document window—size
Ctrl-G GoTo
Ctrl-H Replace
Ctrl-I Italics
Ctrl-J Justify—Full
Ctrl-K Hyperlink
Ctrl-L Align—Left
Ctrl-M Indent—increase
Ctrl-N New document
Ctrl-O Open a document
Ctrl-P Print
Ctrl-Q Remove Paragraph formats
Ctrl-R Align—Right
Ctrl-S Save
Ctrl-Shift- >or <Font next/ previous size
Ctrl-Shift -Hard hyphen
Ctrl-Shift = Superscript
Ctrl-Shift-8 Nonprinting characters on/off
Ctrl-Shift-A All Caps
Ctrl-Shift-C Copy formatting
Ctrl-Shift-D Double Underline

Ctrl-Shift-Enter Break column

Ctrl-Shift-F Font Face
Ctrl-Shift-K Small Caps
Ctrl-Shift-L List Bullet Style
Ctrl-Shift-M Indent decrease
Ctrl-Shift-N Normal Style
Ctrl-Shift-T Hanging indent decrease
Ctrl-Shift-Tab Dialog box previous tabbed section
Ctrl-Shift-V Paste formatting
Ctrl-Shift-W Underline words only
Ctrl-spacebar Remove Character formats
Ctrl-T Hanging Indent—increase
Ctrl-Tab Dialog box next tabbed section
Ctrl-U Underline
Ctrl-Up/Down GoTo Next/Previous Paragraph
Ctrl-V Paste
Ctrl-W Close
Ctrl-X Cut
Ctrl-Y Repeat/Redo
Ctrl-Z Undo
F1 Help
F10 Menu Bar
F12 Save As
F7 Spelling and Grammar check
F8 Selection extended
F9 Update selected field
Shift-drag Drawing—constrain shape to symmetrical
Shift-drag Graphic—crop
Shift-Enter Line break
Alt Drag Vertical Selection
Shift-F10 Shortcut Menu
Shift-F3 Case change (capitalization)
Shift-F7 Thesaurus
Shift-F8 Selection reduced

COMPUTER HARDWARE

Introduction

Computer hardware refers to the tangible & physical parts of the computer used for input, processing, storage & retrieval of information from the computer.

Categories of computer hardware

1. Input hardware
2. Output hardware
3. Storage hardware
4. Processing hardware
5. Communication hardware

1. Input hardware

Input hardware are devices used to enter data or commands in a form that the computer can use. They send the data or commands to the processing unit.

Example of Computer Input devices:

- | | |
|----------------------|-------------------|
| 1. Graphical tablets | 7. Track balls |
| 2. Game pad | 8. Microphone |
| 3. Scanner | 9. Digital camera |
| 4. Barcode reader | 10. Joy stick |
| 5. Touch pad | 11. Webcam |
| 6. Key boards | 12. Mouse |

Categories of input hardware

According to the type of data they input, input devices can be grouped into the following:

- | | |
|---------------------------|--------------------------------|
| a) Text input devices | e) Audio input Devices |
| b) Pointing input Devices | f) Biometric input Devices and |
| c) Imaging input Devices | g) Other Specialized input |
| d) Gaming input Devices | |

a) Text input devices

Text is a general word for all characters such as letters, numerical digits, symbols and marks that combine to form words & sentences.

Text input devices are the devices used to enter text into the computer.

Examples of text input devices

1. The keyboard,
2. Voice Recognition Equipment
3. Optical mark reader (OMR)
4. Barcode readers
5. Optical character reader (OCR)
6. Magnetic ink character readers (MICR) readers
7. RFID readers
8. Magnetic Strip Card Readers, etc.

1. The Keyboard

A keyboard is an input device, consisting of a set of keys (buttons) used to operate a computer. Each Press of a key corresponds to a single written character of text.

To produce some symbols, it requires pressing and holding several keys simultaneously. (key board shortcut)

Usually a standard keyboard has between 80 to 110 keys.



Key board lay outs

1. QWERTY
2. Dvorak
3. ABCDE,

4. GKOS,
5. QWERTZ
6. AZERTY

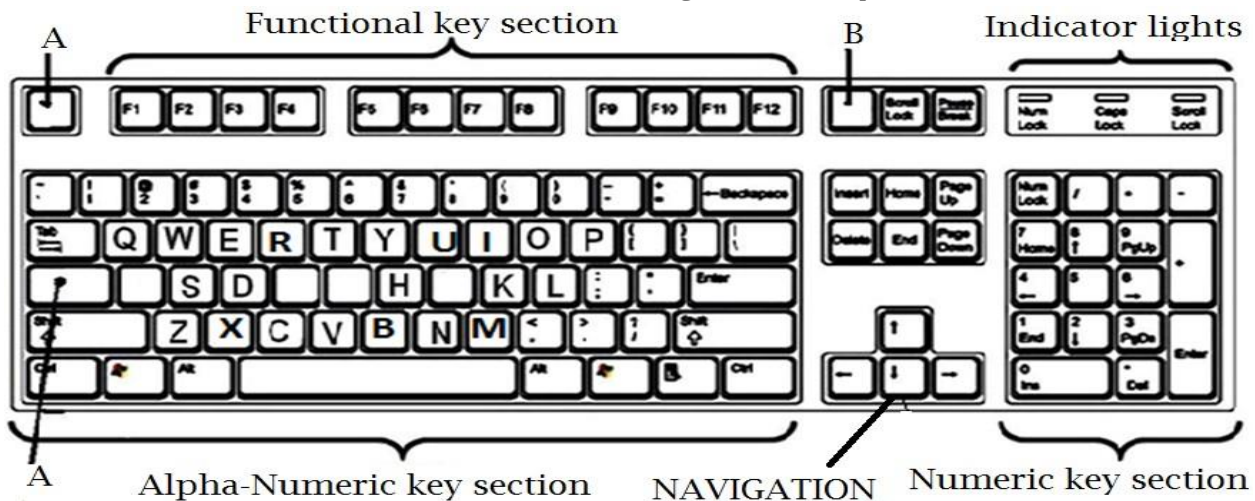
The **QWERTY** is referred to as the "Universal" keyboard.

The name "**QWERTY**" comes from the first six letters in the top alphabet row.

The first practical typewriter and the QWERTY keyboard still in use today was discovered by Christopher Latham Sholes In 1866



Sections of the QWERTY key board...



1. Functional key section
2. Navigational key section
3. Numeric / number key section
4. Alpha-numeric key section
5. Indicator lights

QUESTIONS

1. State the functions of each section of the key board.
2. Mention the special keys of the key board and state the function of each
3. Outline examples of standard keyboard layouts
4. What is a key board shortcut?
5. Outline examples of shortcuts and their commands

TYPES OF KEYBOARDS

1. **Traditional key board.** This is a full sized keyboard.
2. **Flexible keyboard.** This is a portable type of keyboard that can be folded.
3. **Keypad.** This is a miniature keyboard used on portable devices such as PDAs & laptops.
4. **Braille keyboard.** This is a keyboard for the blind.

Advantages of Keyboard

1. Key boards are cheaper because they are commonly supplied with computers
2. A key board is faster at entering commands into the computer as compared to the mouse
3. Keyboards are more reliable as compared to other input devices.

Demerits of Keyboard

1. It takes a lot of time to practice in order to type quickly
2. Keys can easily become faulty due to dust.
3. Some keyboards keys are very hard to press, causing fingers to hurt

The key board short cut

This is a combination of keys pressed together at the same time to issue a command into the computer.

Examples of keyboard short cuts

Ctrl + F2 = Print preview

Ctrl + Alt - Adds a new page (Page Break) Ctrl + Alt + F2 = gives 'Open file dialogue box'.

Ctrl + Alt + Del = initiates a reboot (warm boot)

Ctrl + P = initiate print dialog box

Ctrl + B = bolds a selection Ctrl + S

= saves a file Ctrl + V =

Paste.

Ctrl + N = New file etc

2) Voice recognition equipment

This is a device which converts spoken words to text. Computers with Speech recognition do not actually understand speech, but they are programmed to recognize a vocabulary of words, which can range from two words to millions of words.

Advantages of using speech recognition for text input

1. No typing of data is necessary.
2. Voice recognition can be used by people whose hands are disabled.
3. Dictating text is faster than typing.
4. Voice Recognition systems are also ideal for the blind

Demerits of text input by speech Recognition 1. Error rate is high, depending on user's accent.

2. Words with the same pronunciations (Homophones) like see and sea cannot be distinguished
3. Speech Recognition does can't work in noisy environment
4. The Voice Recognition software must be trained to recognize more words.
5. It requires the user to speak in a writing style, i.e. even pronouncing the marks such as comma.

3. Optical mark recognition (OMR)

Optical mark recognition (OMR) devices read hand-drawn marks such as small circles or rectangles.

Q1R Meter # 9876543 Account # 0123456789

Current Due Date/Amount Due 07/28/98 31.54

Total 31.54

Amount Enclosed \$ 31.54

JUL 1998 00123456789

Presque Isle Electric & Gas Co-op.
P.O. Box 308 49765-0308
Onaway MI 49765-0308

001234567890000321500003154

PLEASE RETURN THIS PORTION WITH PAYMENT

Presque Isle Electric & Gas Co-op • P.O. Box 308 • Onaway, MI 49765

Day or Night: 81/21 222-8815 or 800-423-0004

Account #	Billing Period	Used this month last year	SW Type	Rate Schedule
0123456789	05/24/98 To 06/24/98	309	REGULAR BILL	RESIDENTIAL
After Number 9876543	Previous Reading 31500	Present Reading 31400	Miles 100	KWH 278
PRIOR BALANCE 37.89				
PAYMENT(S) JUN 98 37.89				
CURRENT CHARGES 278 KWH @ 6.091050 22.53				
SERVICE CHARGE 7.39				
FICK ADJ 0.39				
TAX 0.93				
TOTAL DUE 31.54				

THE ANNUAL COMPANY READINGS FOR ALPENA, ALCONA, & P.I. COUNTY WERE USED FOR JUNE BILLING.

SW Location	Current Amount Due	07/28/98	Amount After Due Date	Total Due
MC 10710	31.54	31.54	31.54	31.54

Pay to the order of: MR & M OTHER

10/09/07

000157 998167 12345678 09

4. Barcode readers

A bar code reader is an input device that uses laser beams to read bar codes that are printed on items usually in super markets.

A bar code is an identification code that normally consists of a set of vertical lines and spaces of different widths.

The bar code represents data that identifies the item, its price and the manufacturer.



5. Optical character recognition (OCR)

Optical character recognition (OCR) is a technology that involves reading typewritten, computer-printed, or handwritten characters from ordinary documents and translating the images into a form that the computer can understand.

OCR devices include a small optical scanner for reading characters and sophisticated software (OCR software) for analyzing what is read.

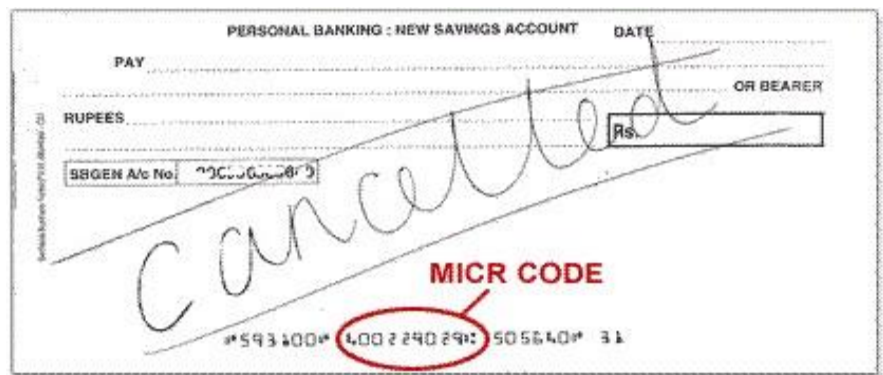
6. MICR readers

A magnetic-ink character recognition (MICR) reader is used to read text printed with magnetized ink.

MICR readers are mainly used by the banking industry for processing checks.

Each check is inserted into an MICR reader, which sends the check information to a computer for processing.

MICR readers



7. RFID readers

Radio-frequency identification (RFID) is a technology that uses radio waves to transfer data from an electronic tag, attached to an object, through a reader for the purpose of identifying & tracking the object.

RFID can work over a long distance. An RFID tag can be affixed to cars, computer Equipment, books, mobile phones, etc



8. Magnetic Strip Card Readers

This is a device that reads the magnetic stripe on the back of credit cards, bank ATM cards, and other similar cards.

A **magnetic card reader** retrieves stored information from a magnetic card either by holding the card next to the device or swiping the card through a slot in the device.



Magnetic strip card reader



B) POINTING DEVICES

A pointing device is an input device, which allows users to move a pointer and make selections on the computer screen.

Pointing device input **spatial data** into a computer.

Examples of pointing devices:

- 1) Stylus pen & digitizing tablet
- 2) Cordless Mouse
- 3) Trackball
- 4) Touchpad
- 5) Light pen
- 6) Touch Screen
- 7) A Track Point

1. Stylus pen & digitizing tablet

Stylus pen is a pen like device used to make drawings on a digitizing tablet.



2. Mouse

A Mouse is a hand held input device used to point to and make selections of items on the screen.

A mouse has 3 buttons i.e.; Left button, Right button & Scroll button

It has a sensor at the under surface

TYPES OF MICE

1. Mechanical Mouse
2. An Optical mouse
3. A cordless mouse
4. Track ball mouse



3. Cordless Mouse

Cordless Mouse this is a wireless mouse. It runs on a battery.

When you move the mouse it sends an infrared beam to a sensor which interprets it causing the pointer to move.



4. Trackball

Trackball - The trackball is an upside-down mouse that remains stationary on your desk.

**Advantages of using a mouse**

1. It is user friendly to computer beginners
2. It is easier and convenient to use with graphical user interfaces.
3. Using a mouse to select items or to move to a particular position on the screen is faster than using a keyboard

Disadvantages of using a mouse

1. It is not easy and convenient to input texts using a mouse
2. It is slower at issuing commands into the computer compared to the key board.
3. It requires some practice in order to control a mouse properly.
4. It is not accurate enough for drawings that requires high precision
5. It usually requires a flat surface to be used.

5. Touchpad

This is Common on laptop computers. It has sensors that sense your touch and send a signal to the computer to move the mouse pointer to that location on the screen.

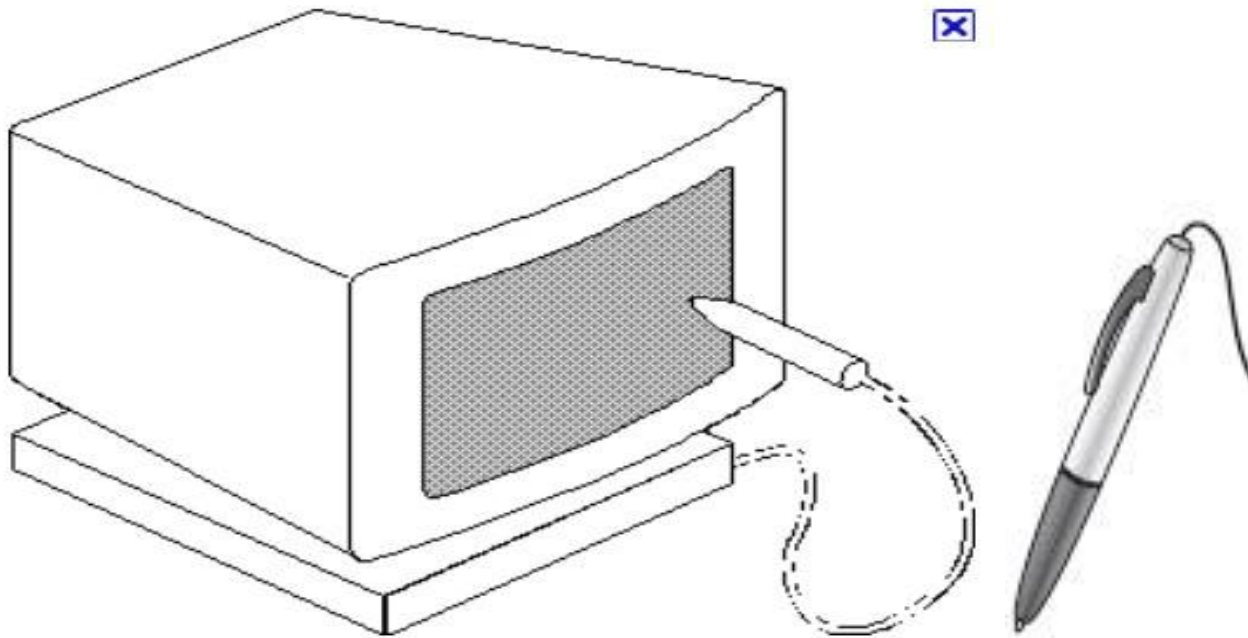


6. Light pen

Light pen- is a form of a light-sensitive rod used in conjunction with a computer's CRT monitor. It allows the user to point to displayed objects, or draw on the screen, in a similar way to a touch screen but with greater positional accuracy.



Light pen



7. Touch Screens

A touch screen is a touch-sensitive input display device. Users can interact with these devices by touching areas of the screen. It is often used for information kiosks located in departments.



8. Track Point

A Track Point/ a pointing stick, is a cursor control device located in between G, H, and B keys of some keyboards. The Track Point is operated by pushing in the general direction the user wants the cursor to move. Increasing pressure causes faster movement.



c) Imaging Devices

These are input devices used to enter images such as still photos, motion pictures, graphics & video etc. into the computer for processing.

Examples of Imaging devices:

1. Image scanner
2. Digital Camera
3. Digital video (DV) camera
4. Camcorder
5. Web cam

1. Scanner

A scanner is a light-sensing input device that converts hardcopy documents to a softcopy (electronic version) which can then be stored on a disk. The electronic version of scanned material is in the form of rows and columns of dots called a **bitmap**. Each dot on a bitmap consists of one or more bits of data.

Common types of scanners

1. Flatbed scanner
2. Pen or handheld scanner
3. Sheet bed scanner
4. Drum scanner



Why should one use soft copies instead of hard copies?

1. Soft copies are easier to carry compared to hard copies.
2. Soft copies can be shared with many people in a short time unlike hard.
3. Soft copies can be easily edited unlike hard copies.
4. Soft copies can easily be formatted unlike hard copies.
5. Soft copies can be easily stored and cannot be easily damaged by weather changes.
6. It is easier to backup softcopies unlike hard copies

2. Digital Camera

This is a device used to take and store the photographed images.



Digital video (DV) camera

This is used to capture (shot) and store videos which are entered into the computer for further editing.



Camcorder

This is a light video camera that records videos in digital form onto a storage device such as a videotape.



Web cam

This is a type of digital video camera that usually sits on top of the monitor. It is also called a PC video camera. Some laptop computers have built-in Web cams



Audio input devices

These are devices used to enter sound into the computer.

Examples include;

1. Microphone
2. Dictaphone
3. Sound cards
4. MIDI devices

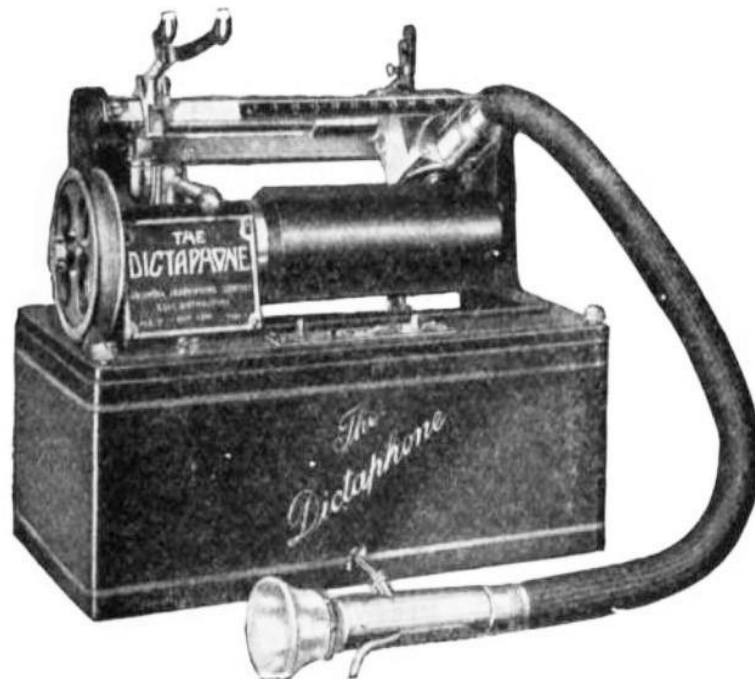
1. Microphones

A microphone is an instrument used to convert sound waves into electrical energy variations, which may then input into the computer for processing, recording or audio playback. Microphones are connected to the sound card in the system unit.



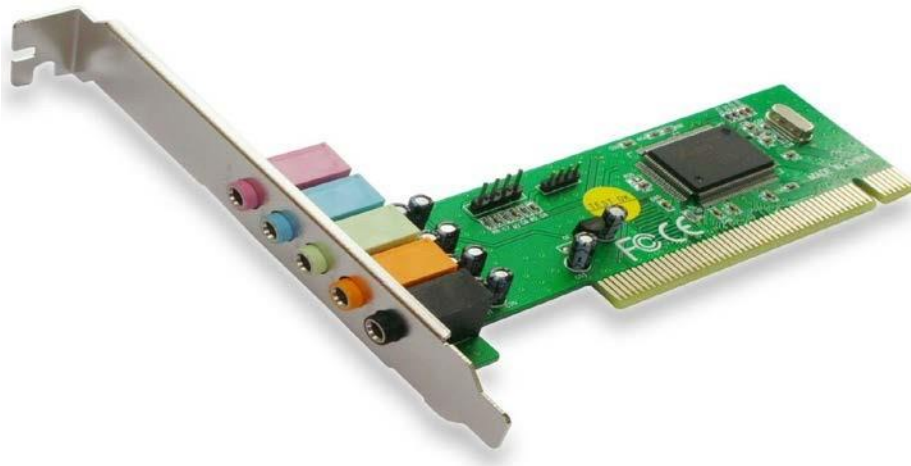
2. Dictaphone

This the earliest device most commonly used to record speech for later playback or to be typed & printed out. It was established by Alexander Graham Bell in Washington, D.C. in 1881.

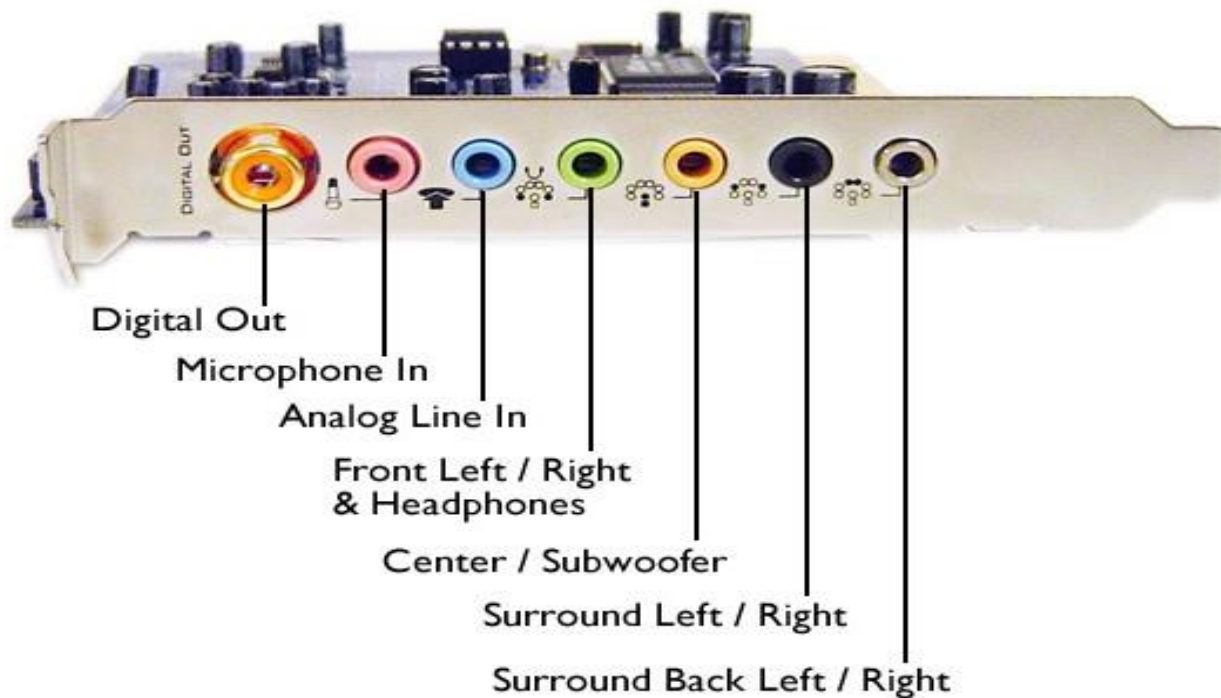


3. Sound Card

A device inside a system unit that allows the use of audio components. Without a sound card, Audio input & output is not possible.



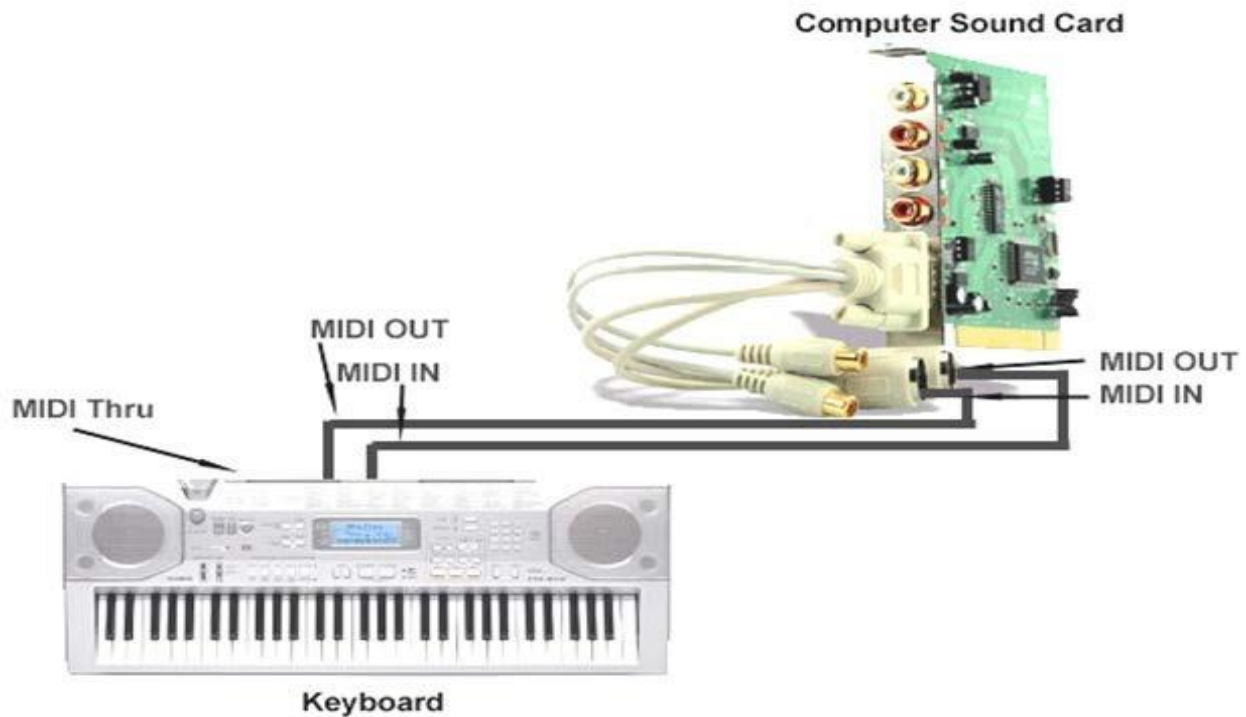
Outer parts of a sound card



4. MIDI devices

MIDI (Musical instrument digital interface) is a standard that defines how digital musical devices represent sound electronically. MIDI devices such as electronic pianos allow users to record and edit music. For example, you can set the beat speed, and add notes, to produce sound.

MIDI devices



Biometric input Devices

This is a device that proves an individual's identity by reading their biological characteristics in order to gain access to a system or networks. In relation to computers and security, "**biometrics**" is the identification of a person by the measurement of their biological features.

Mode of operation Biometric devices:

Biometric devices convert personal characteristics into digital codes which are compared with another digital code stored inside the security system. If the personal characteristics are matching/ compatible with the code stored in the system, the system opens and allows access to its services.

If the personal characteristics are incompatible with the stored characteristic, the system does not open and denies access of that person to its services.

Examples of biometric devices

1. Finger print scanner
2. Hand geometry system
3. Face recognition system
4. Voice recognition system
5. Signature verification systems
6. Iris recognition system

Biometric devices & Functionality

1. Voice recognition system: This Captures a person's speech and compared it with that stored in memory to allow or deny access.

2. Finger print scanner:

This captures curves and identifications of finger prints



3. Hand geometry system:

This Measures shape and size of the person's hand



5. Face recognition system: Captures a live face and compares it with those in storage to allow or deny access.



6. **Signature verification systems:** Recognizes the shape of the hand written pattern of a person and compares it with one in storage



7. **Iris recognition system:** reads the blood vessel patterns at the back of the eyes and compares it with the ones in storage.



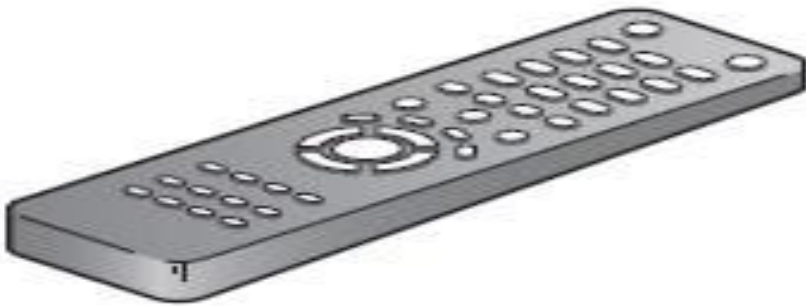
g) Other Specialized input devices

These are used for doing special customized tasks. Examples:

1. Remote Control

2. Sensors

Remote controls: These are used to operate computerized devices such as TVs, radios, Laptops from a distance.



• Sensors

These are devices that respond to changes in the physical environment, convert them to electrical signals that are entered into the computer for processing.

Examples of sensors include

- a) Heat sensors
- b) Light sensors
- c) Humidity sensors
- d) Temperature sensors
- e) Pressure sensors
- f) Ph sensors
- g) Water flow sensors etc

PROCESSING HARDWARE

Introduction

The Central Processing Unit (CPU) is a physical component within the system case whose major purpose is to process data. Hence the name **processor**. The CPU is also called the **brain** of the computer. Being one of the most important components, a computer without a CPU is just like a television set which cannot process data.

The process of turning data (raw facts) into information is called **data processing**.

The greatest company in the production of processors is **Intel**.

Terminologies related to the processor

1. **Multi-core processor:** this is a single chip with two or more separate processors. The common Multi-core processors used today include: the **dual core** and the **quad-core**.
2. The **dual-core:** is a chip that contain two separate processors
3. The **quad-core:** Is a chip that contain four separate processors or cores.

4. Multiprocessing.
4. A **coprocessor** is a computer processor used to increase the functions of the main processor (CPU)
5. **Pipelining** is the situation where the CPU starts executing a second operation before it completes the first operation.
6. **An intergrated CPU**, is the type of CPU that combines functions of the processor

FUNCTIONS OF THE CPU

1. It controls devices under its care
2. It helps in all stages of data processing
3. It performs logical computations & comparison of data
4. It determines how fast a computer performs a function
5. It is used as a yardstick to determine the type & the model of the computer
6. It helps the user to work with many programs at the same time.
7. It stores data temporarily for the computer.

Types of processors

- 80286 – Pentium IV
- 80386 – Pentium V – 80484 – Dual core
- Pentium I (80556) – Quad core
- Pentium II – Core i 3
- Pentium III – Core i 7 etc.

COMPONENTS OF THE CPU

A CPU has 3 major parts namely;

1. The Control Unit,
2. The Arithmetic Logical Unit
3. The registers

control unit:

Directs and coordinates most of the computer operations and activities that take place within the processor.

2. The arithmetic logic unit:

Performs arithmetic operations (+, *, - and /) involving integers and logic operations such as comparing data or determining whether a specific operation is true or false

3. Registers:

These are small high speed memory chips within the computer processor to temporarily store data during processing.

Common types of registers

1. **Program counter:** holds the address of the next instruction to be fetched.
2. **Instruction register:** holds the current instruction fetched from memory.
3. **Instruction decoder:** interprets the instruction currently held in the instruction register.
4. **Accumulator:** holds the data item to be processed & the result of the arithmetic and logical operations.
5. **Status register:** holds collection of condition flags which describe the status of the most recent operation carried out by ALU

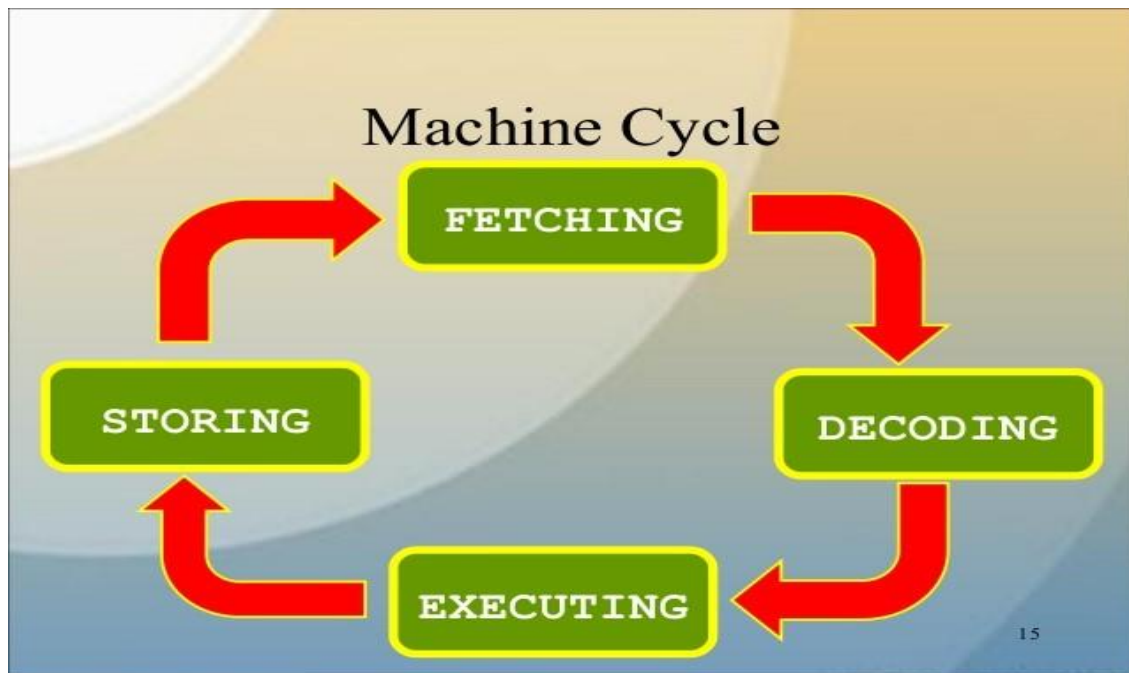
THE CENTRAL PROCESSING UNIT (CPU) MACHINE CYCLE

Machine cycle: This refers to the four sets of basic operations performed by the CPU for every computer instruction. Machine cycle is also referred to as **e-time** These **include:**

- 1) Fetching
- 2) Decoding
- 3) Executing
- 4) Storing

The machine cycle

- 1) **Fetching:** is the process of obtaining a program instruction or data item from internal memory or RAM
- 2) **Decoding:** is the process of translating a program instruction into commands (signals) the computer can understand / execute.
- 3) **Executing:** is the process of carrying out a command
- 4) **Storing:** is the writing of the executed results into internal memory or RAM.



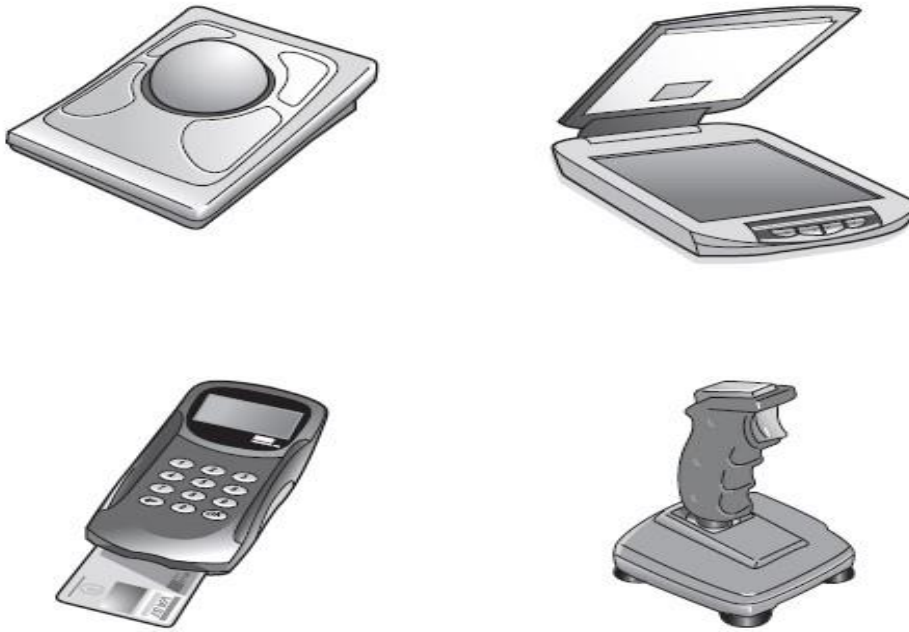
Measuring the processor speed

Processor speed is measured in Megahertz (**MHz**).

(1 MHz = 1,000,000 cycles per second) Sometimes the processor speed is expressed in Instructions per second (IPS)

Revision question

1. a) What is a CPU?
 b) List 4 types of the CPU
 c) Outline the functions of the CPU in the computer.
2. a) List the main components of the CPU & state the function of each component. b) What do you understand by;
 - a) Pipelining
 - b) Co-processor
 - c) Duo core
 - d) Clock speed
3. a) What do you understand by the machine cycle.
 b) Explain the CPU basic operations each of the machine cycle
 C) Identify the following hardware



STORAGE HARDWARE

Storage hardware; these are the devices and media used to store data for future use.

Data Storage refers to keeping of data, instructions or information for future use.

The computer storage system comprises of;

❖ A storage medium & A storage device.

A storage medium is a physical component where data is actually stored e.g. A compact disk & Digital versatile disk

A storage device is a physical component that reads and writes information onto a storage medium. E.g. a DVD drive, Floppy disk drive

In order to be read or written to, a storage medium must first be inserted within the appropriate storage device.

A storage device can be;

1. Internal (located in the system case)
2. External (plugged through an external port)
3. or Remote (located on another comp)

Examples of storage medium & devices

Storage medium

1. Compact disk
2. Floppy disk
3. Flash disk
4. Hard disk

- 5. Jazz disk
- 6. Blu-Ray disk

Storage device

- a) Compact disk drive
- b) Floppy disk drive
- c) Flash disk drive
- d) Hard disk drive
- e) Jazz disk drive
- f) Blu-Ray disk drive

TERMS RELATED TO COMPUTER MEMORY

1. **Memory:** This is the temporally storage area in a computer for holding data, instructions and information.
2. **Reading:** This is the process of transferring data, instructions & from the storage medium into memory.
3. **Writing:** This is the process of transferring data, instruction & information from memory to a storage medium.
4. **Storage capacity:** This Refers to amount of data a storage medium is able to hold.
5. **Access Time:** is the amount of time it takes to locate an item on a storage medium
6. **Sequential access:** data is accessed in order from the first location to the last.
7. **Random access:** this is a method of data access where data is accessed from any location on the device.
8. **A computer primary storage device:** This is a component in your computer that stores information for a short period of time.
9. **Primary storage drive:** is the hard drive which holds operating system in your comp e.g. local disk c
10. **Transfer rate / Data transfer rate (DTR):** This is the amount of digital data that is moved from one place to another in a given time.

Data transfer time from between the microprocessor or ram and Devices such as hard disk is usually measured in bytes per second.

COMPUTER MEMORY

Computer memory refers to the storage location (area) in a computer where files and programs reside. Computer memory is measured in **bytes**. **Types of computer memory**

1. Primary memory:
2. Secondary memory

PRIMARY MEMORY

This is a temporally storage that holds data and program instructions waiting to be processed by the computer.

- ✓ Primary memory is the main computer storage area where data is stored for quick access by the computer's processor.

Primary memory can alternatively be called;

- ❖ Main memory
- ❖ Internal memory
- ❖ Random access memory
- ❖ Immediate Access Memory

Examples of Computers primary storage memory chips

- 1) Cache memory
- 2) Registers
- 3) RAM
- 4) ROM

Primary memory chips

- 1. Registers:** These are primarily used by the processor to handle calculations used to operate the program.
- 2. Cache Memory (CPU Memory):** This is a high speed memory which holds frequently used instructions by the CPU.
- **3. RAM (Random Access Memory):**

This is a primary memory which stores information being processed temporarily and sends it at a very fast rate to other comp components (north bridge) and then for use to the GUI which allows the user to access information with the mouse , key board monitor etc.

Random Access Memory (RAM):

This is a type of memory that can be read or changed by the computer processor to store information temporarily.

Types of RAM

1. Dynamic RAM
2. Static RAM.
3. Flash RAM / flash memory chip:
4. Magneto resistive RAM (MRAM)

1. **Dynamic RAM (DRAM):** This is a type of RAM that requires a constant supply of power to refresh and retain its content.
2. **Static RAM (SRAM)** This is a type of RAM that requires constant but less power supply compared DRAM to retain its content. SRAM is faster, more reliable and stable than **DRAM**.
3. **Flash RAM / flash memory chip:** can retain data even if power is interrupted.
4. **Magneto resistive RAM (MRAM):** This is a type of RAM which Store data using magnetic charges instead of electrical charges. **MRAM** has great storage capacity, consumes less power and has a faster access time than electronic ram.

4. Read Only Memory (ROM)
This is a type of memory that can be read on by the computer but not altered or changed by the computer processor. **ROM** is non - volatile memory & is also known as firmware:

The instructions for starting the computer are stored on the ROM

Types of ROM

- 1) Mask ROM
- 2) Programmable Read Only Memory (**PROM**);
- 3) Erasable Programmable Read Only Memory (**EPROM**)
- 4) Electrically Erasable Programmable Read Only Memory. (**EEPROM**):
- 5) Electrically Altered Programmable Read Only Memory (**EAPROM**):

1. Mask ROM:

This is a type of ROM where information is stored at the time of its manufacturing so that it cannot be changed latter on.

1. PROM:

This is a ROM chip on which data is stored once by the programmer during its time of manufacture and it cannot be altered later on.

1. **Electrically Altered Programmable Read Only Memory (EAPROM):** information on it can be change later.

4. EPROM:

This is a ROM chip retains its content until exposed to ultra violate light.

To write to & erase an EPROM, a special device called prom programmer or prom burner is needed.

5. EEPROM:

This is a special type of ROM whose content can be change by exposing it to an electrical charge or high voltage current.

Differences between ROM and RAM

RAM	ROM
1. Volatile,	1. Non Volatile,
2. Its Contents is lost when power goes off	2. Its Contents remain when power goes off
3. Read and Write	3. Read Only
4. Can be increased	4. Cant be Increased
5. Not installed at Factory	5. Installed at Factory
6. Temporally	6. Permanent

Uses of primary memory in a computer

- a) It stores data temporarily during the period of data processing.
- b) It is necessary at the time of booting up the computer.
- c) It establishes initial communication between a computer and its basic hardware component at the time of booting up the computer.
- d) It keeps logs of frequently used/visited files to enable quicker loading of these files when accessed.
- e) It determines the efficiency and the performance of the computer.
- f) It enables the user to recover his work in memory for the last 5 minutes in case power is cut off.
- g) It improves on the efficiency of the computer by providing extra space for swapping files in and out of the hard drive to create for space (RAM) at the time of processing.

SECONDARY MEMORY

This is the type of memory that stores data permanently for future use.

Secondary memory is alternatively called

- ❖ Auxiliary memory
- ❖ External memory or
- ❖ Secondary memory

Types of computer secondary storage devices.

a) Magnetic secondary storage devices.



b) Solid state secondary storage devices

c) Optical secondary storage devices.

a) Magnetic secondary storage media/devices

These devices which store information, data or programs in form of magnetic fields

Examples of Magnetic secondary storage devices

- 1) Magnetic tapes
- 2) Floppy disks
- 3) Hard disk,
- 4) Zip disks,
- 5) Jazz disks.

1) Magnetic tape

This is a storage media that consists of a thin tape with a coating of fine magnetic material used for recording data. Data is stored / written onto the magnetic tape by a **tape drive**.

On a magnetic tape, data is accessed sequentially where the first data to be stored is accessed first & vice versa.

Advantages of magnetic tapes

- 1) Can hold huge amount of data depending on the length of the tape
- 2) It is used for back up purposes
- 3) It is portable because it is reduced in size
- 4) It can be set to run automatically.

Disadvantages of magnetic tapes

1. They are bulky
2. To read data that was created at the beginning, one needs to rewind
3. Rewinding and unwinding can lead to erasing of data.
4. It is time consuming to rewind the tape to find the specific location of data to view.

2) Floppy diskette

This is a storage medium made up of a thin circular plastic material coated with a magnetic recording system where data is stored in tiny magnetic particles. Floppies are available in the sizes of 3 storage capacities i.e.;

- 5.25 inch which stores 360 Kb,
- 1.2 Mb which stores 320Kb

3.5 which stores 1.44Mb, 2.88Mb etc

Advantages of floppy disks

1. They are used to transport data from one computer to another.
2. They are used to back up copies in case the computer hard disk crashes
3. They are portable
4. They are cheap.

Disadvantages of floppies

1. They have low storage space
2. They operate at a low speed
3. If not properly handled, they can lead to loss of data
4. Data can easily be lost when their magnetic surface is exposed to magnetic field
5. They are very good sources of transmission of computer viruses.

Care & maintenance of floppy disk

1. Keep diskettes away from magnetic fields.
2. Do not keep heavy objects on top of the disk
3. Do not fold or bend the diskette
4. Do not expose the disk to excessive heat or light
5. Do not pullout the diskette from the drive when the drive light is still on.
6. Do not touch the disk surface.

HARD DISK

This is a metallic magnetic media housed in the system unit. The hard disk is used as the main secondary storage device in the computer.

Advantages of a hard disk

1. Provides a large storage space.
2. Data is always secure
3. Hard disks operate at higher much speed.

Disadvantages of hard disks

- 1) In case of malfunctioning, data can easily be lost and the computer rendered useless
- 2) Since they are metallic, they expand and relax depending on temperature which may lead to data losses.
- 3) If un protected, hard disks are easily attacked by viruses.

Nb. hard disk may fail due to vibration (violent shaking)

Benefits of magnetic storage devices.

1. They are cheap
2. They allow direct access of data on any part of the drive
3. Have a very fast access time
4. have very large amount of storage space.

Disadvantages

1. Data can be altered by magnetic fields, dust and mechanical problems
2. They Gradually lose their data over time
3. Hard disks eventually fail which stop the computer from working.
4. The surfaces of the disk can loss data within sectors with regular crashes.
5. Cannot transfer the disk to another computer easily.

b) Optical storage devices.

These are devices that use laser beams to record information by creating differences in optical densities. They are flat, circular, Made up of plastic or glass discs on which data is Stored in form of light & dark pits.

Examples of optical storage media

- 1) Compact disks (CD)
- 2) Digital Versatile Disks (DVD),
- 3) High Density Digital Versatile Disc (HDDVD),
- 4) Blu ray disks.



Optical storage devices

Optical storage devices exist in 3 different formats which include;

1. Read only
2. Write once
3. Write many

Compact disk read only memory (CDROM)

This is a thin circular optical storage medium on which information is stored.

It is called a **compact disk** because it stores a lot of information in a very small area.

It is 12cm in diameter and a few millimeters thick

Merits & demerits of CDs

Advantages

1. Holds a lot of data in a small area
2. They are good for distributing software programs
3. They are portable and easy to store because of their size
4. Their access speed is very high

Disadvantages of CDs

1. A simple scratch can render the whole CD useless
2. If mishandled, they can easily break.

Advantages of optical storage devices.

1. Optical discs are portable and can be read on by many different devices.
2. Are very inexpensive
3. Are durable and last for a long time.
4. Optical media retain their Memory even when power is turned off.
5. Can allow Random data access no matter where or when it is stored.
6. Are more resistant to viruses as compared to other storage devices.

Disadvantages of optical storage devices

1. They require special devices to read or write data on them.
2. Compared to other storage devices, they have less storage space.
3. Lack of standards for grading quality and for longevity test.
4. You can write once on read only CD-R, DVD-R and BD-R formats

c) Solid state drive (SSD)/ solid state disk:

This is a data storage device that uses integrated circuit assemblies to store data persistently. These store data using flash memory, a type of Electronically Erasable Programmable Read Only Memory.



Characteristics of solid state storage devices

They have no disks inside, have no motors to drive the discs or moving mechanical parts. They are based on electronic circuits with no moving parts. (no reels of tape, no spinning discs, no laser beams etc.) Usually, they connect to the computer through the Universal Serial Bus (USB)

- Examples of solid state storage media
 - 1) Flash disks (USB memory stick/thumb drive)
 - 2) Memory cards,
 - 3) Smart cards.



Memory cards;

These are used by many mobile digital devices such as cameras, mobile phones and mp3 players. Digital cameras use the **SD** cards that store digital images taken by the camera. Mobile phones have a SIM card (**Subscriber Identity Module card**) that contain the phone numbers, the phone book numbers. Many phones have extra **Memory cards** for storing music, video and photos.

Advantages Solid state storage devices

- a) They Start up faster than magnetic hard drives due to lack of spins
- b) They have faster launch time
- c) They last longer and some are water proof
- d) All data stored on them can be scanned quickly for security purposes.

Disadvantages of Solid state storage devices

- 1) They are expensive to buy
- 2) Vulnerable to abrupt power loss, magnetic fields, electrical and static charges.
- 3) Larger erase blocks make random write speeds slow.

Advantages of secondary storage devices over primary storage devices

1. **They are non volatile:** Cannot lose their data when power is off.
2. **Mass storage:** have a very large data storage capacity
3. **Cost effective:** Compared to main primary memory, secondary storage devices are cheaper.
4. **Re-usability:** one can erase data and reuse the secondary storage device as many times as possible.

Care for storage devices / medium

1. Do not bend the diskette to avoid damaging its sockets

2. Do not touch the sensitive parts of the storage medium with fingers. Hold diskettes by corners
3. Do not expose them to extreme heat and magnetic fields
4. Always label storage medium for easy identification
5. When labeling, use a soft marker instead of a sharp instrument
6. Keep storage medium / devices away from dust.
7. Always format a new storage medium before use.

COMPUTER MEMORY MEASUREMENT UNITS

- ❖ A bit: is a value of either 0 or 1 (off or on)
- ❖ Nibble: a value of 4 bits
- ❖ Byte: a value of 8 bits
- ❖ Kilobyte: =1024 bytes
- ❖ Megabyte = 1024 kilobytes
- ❖ Gigabyte =1024 megabytes
- ❖ Terabyte =1024 gigabytes

A bit is an abbreviation for binary digit. 1 bit is equivalent to one character

Qn How many bits are in the word "coperative"?

Solution:

Here we calculate the number of characters in the word
= 11bytes

➤ How many bytes are in the word "co-perative"

Solution

1 byte = 8 bit
= 11x8
=88bytes.

DATA REPRESENTATION & NUMBERING SYSTEMS

There are two numbering systems used by the computers which include;

- a) The binary numbering system
- b) The hexadecimal numbering system.

The coding schemes

Coding is the process of making 0s and 1s in such a way that they can be used to represent characters, digits or other values. There are two coding schemes which include;

1. **ASCII:** American standard Code for Information Interchange.
2. **EBCDIC:** Extended Binary Coded Decimal Interchange Code.

OUTPUT HARDWARE DEVICES

Output devices are hardware devices that retrieve information from a computer.

They are devices with which can display, represent & produce information. **Output** refers to data that has been processed into useful information. Forms of Output include;

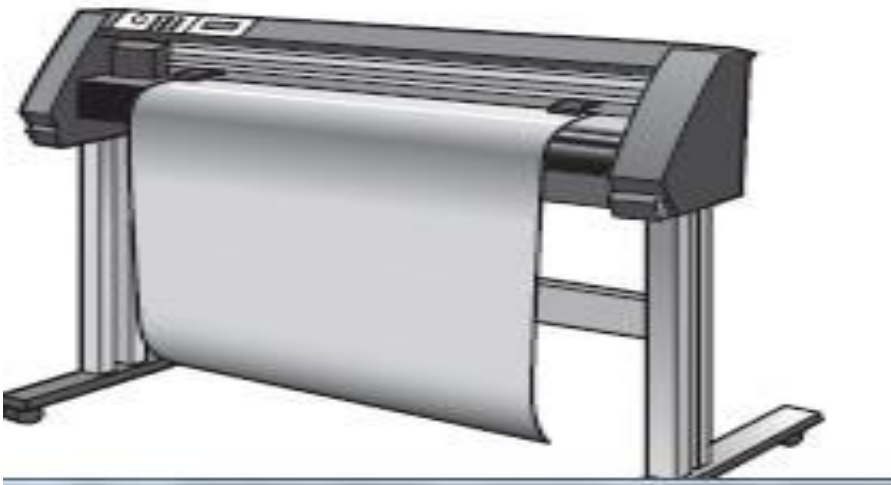
- i. text,
- ii. Graphics,
- iii. Audio (sound) & video

Examples of output devices

1. Plotters
2. Speakers
3. Light Emitting Diodes (LED)
4. Monitors
5. Projector
6. Printers

1. Plotters

Plotters are output devices with a series of moving pens used to draw thin straight & meandering lines accurately. They are often used to produce building plans, maps, technical drawings printed circuit boards & machine parts.



2. Speakers

These are devices that output sound from a computer.



3. Light Emitting Diodes (LED)

They are small low power devices on the system unit which emit light

Light Emitting Diodes are used to;

1. Show that the computer is on
2. Show that storage devices like CDRom Drive, Hard disk Floppy disks are installed
3. Show that the computer is processing data

4. Monitors /visual display devices

A Monitor is an output device that displays a soft copy of information. Monitors display what is being done in the processor. Monitors are classified as **Visual Display Units (VDU)**. A **VDU** (Visual Display Unit) is an output device that visually conveys text, graphics, and video information to the user.

Examples of visual display devices... 1. CRT Monitors,

2. LCD Monitors
3. Plasma monitors
4. Projectors
5. Head mounted display (Headgears)
6. LED displays

Measurements of monitor performance

The main parameters used to measure monitor performance include;

1. **Resolution.** Refers to the sharpness and clarity of an image.

The higher the resolution, the better the image quality, Resolution is often expressed in dot per inch (**dpi**)

2. **Aspect ratio.** This is the ratio of the horizontal length to the vertical length of the screen. (4:3, 5:4, 16:10 Or 16:9)
3. **Refresh rate.** This is the speed at which the monitor redraws images on the screen. It is measured in hertz.
4. **Response time.** This is the time a pixel in the monitor takes to go from the active (white) to inactive (black) & back to active again. It is measured in milliseconds

5. **Contrast ratio.** This is the ratio of luminosity of the brightest color (white) to that of the darkest colour (black) that the monitor is capable of producing.
6. **Viewing angle:** this is the maximum angle at which at which images on the monitor can be viewed, without excessive reduction in the quality of the image. It is measured in degrees horizontally and vertically.
7. **Power consumption.** This is the amount of electricity consumed by the monitor. It is measured in watts.
8. **Delta-E:** this refers to the colour accuracy measured in delta-E.

TYPES OF MONITORS

Monitors are grouped into types depending on;

- a) The colour of information
 - b) The nature of material they use to display information.
- a) Depending on colour
- a) Monochrome
 - b) Polychromes (Coloured)

1. Monochrome monitors:

These are monitors that display in only one colour e.g. white or green in a dark background. They are normally cheap and used for applications that don't depend on colours very much e.g. word processing.

2. Polychromes (Coloured):

These are monitors which display text and graphics in different colors.

- Merits & demerits of Coloured monitors

Advantages

1. Colours make the screen displays attractive.
2. Colours can be used to highlight error messages and menu options.

Disadvantages

1. Screens with a lot of colours take long to process.
2. More memory is required to display a lot colours.

Depending on the nature on the nature of material used to display

- » Cathode Ray Tube (CRT)
- » Liquid Crystal Display
- » Plasma monitors

1. Cathode Ray Tube:

This is a type of monitor that uses light rays to display images on the screen.

CRT monitors are normally elongated from behind due to the fact that they use cathode ray oscilloscope tube. CRT monitors use the same technology with the home television set. The front of the CRT is the screen coated with tiny dots of phosphor material. Each dot consists of a red, green and blue phosphor and the three dots combine to make up each pixel.



Merits & demerits of CRTs

Advantages

- 1 Can produce fast and rich colour output.
- 2 Can be viewed from a very wide angle.
- 3 Cheaper than LCD monitors in general.

Disadvantages

1. Emit higher electromagnetic radiation (EMR) than LCD monitors.
2. Consume more energy than LCD monitors.
3. Take up a larger desk space compared to LCDs

LCD (Liquid Crystal Display)

This is a flat screen monitor that uses liquid crystal to create images on the screen. LCD monitors produce colour using either passive matrix or active matrix technology.

Advantages & disadvantages of LCD monitors

Advantages

1. They consume less power
2. They take up less space than CRT monitors.
3. They emit less electromagnetic radiations.
4. They have a higher refresh rate than CRTs
5. They have a higher resolution than CRTs

Disadvantages

1. They are usually more expensive than CRT monitors.
2. They can only be viewed from a very narrow angle.

Gas Plasma monitors

These are large flat screen monitors that use gas to create images on the screen. Plasma monitors are bigger than LCD monitors and can be used as both television as well as computer monitors. They have similar advantages and disadvantages to LCD monitors.

5. Projectors

This is a device that takes the image that displays on a computer screen and projects it onto a larger screen so that people can see the image clearly.

Types of projectors

1. **LCD projector.** This uses liquid crystal display technology to display information. LCD projector produce lower quality images.
2. **DLP (Digital Light Processing) projector.** This uses tiny mirrors to reflect light. DLP produce much better images even in a well-lit room.

Advantages of display devices

1. Time to display the image is fast.
2. Screen displays can include text, graphics and colours.
3. Display devices are usually quite.
4. No paper is wasted for obtaining the output.

Disadvantages of display devices

- a) Information produced on the screen is only temporary and will be lost when the power of the display device is turned off.
- b) Unsuitable for users with visual problems.
- c) Needs a separate device to produce a hard copy.

6. Printers

A printer is an output devices used to produce hard copies of information on papers.

Printers turn a soft copy into a hard copy.

❖ A **hard copy** refers printed information on a piece of paper while

❖ A **soft copy** refers to intangible data displayed on the computer screen. The speed of a printers is measured in pages per minute (**ppm**) or character per second (**cps**)

Classification of printers

- 1) Impact printers
- 2) None impact printers

❖ Impact printers

These are printers whose print heads (hammers) get in contact with the print media (paper). They can print on papers, clothes, transparencies, plastic materials etc.

Examples of Impact printers include;

- ❖ Dot matrix,
- ❖ daisy wheel,
- ❖ Epson,
- ❖ Ball Printer,

1. Dot Matrix printers.

This is an impact printer that uses pins which strike an ink ribbon to produce characters. Dot matrix has a head with 9-24 pins which can be pushed out to hit on the paper through a ribbon.

Advantages of dot matrix printers

- 1) They are quite fast (2ppm)
- 2) Dot matrix printers can print multipart forms.
- 3) They can withstand dust environment, vibrations and extreme temperatures.

Disadvantages

- 1) They are generally noisy because of the striking mechanism.
- 2) Have a low Print quality compared to inkjet and LaserJet printers.

2. Daisy wheel printers

This is an impact printer that uses a wheel as a print head to form characters and text. As the wheel rotates, a hammer strikes the backside of the spoke and presses it against the paper to print a character.

Advantages of Daisy wheel printers

- ✦ It can print better quality characters.

Disadvantages

- 1) The printing speed is very slow.
- 2) It cannot print graphics.
- 3) Prints in only one colour (monochrome)
- 4) It is very noisy

3. Ball Printer:

A ball printer is an impact that uses a rotating ball as a print head. The printing characters are on the surface of the ball, which strikes a ribbon to transfer the character onto a paper.

4. DeskJet printers:

This has a head which is pushed against the paper to produce characters or graphics. Its performance is relatively similar to inkjet printers.

Differences between impact & non impact printers

Impact printers	Non impact printers

Generally noisy because of the striking activity.	Generally, much quieter than impact printers because there is no striking mechanism.
Can normally withstand dusty environment, vibrations and extreme temperature.	Cannot withstand dusty environment, vibrations and extreme temperature

Impact printers are Ideal for printing multipart forms because they can easily print through many layers of paper.

2) Non - impact printers:

These are printers that form characters and images without direct physical contact between the printing mechanism and the paper.

Examples include;

1. Laser jet printers
2. Thermal printers
3. Inkjet printers
4. Plotters (wide format printers)

Advantages of non- impact printers

1. They produce better quality output
2. They are faster in printing
3. Some can print colored output.
4. They are relatively quite when printing

1) Laser Jet Printer.

This is a non- impact printer that uses powdered ink to form characters on a paper by heat and pressure. Laser jet printers are also known as **page printers** because they process and store the entire page before they actually print it. They use a similar mechanism to that of a photocopier.

Merits and demerits of laser jet printers.

Advantages

1. They are fast
2. Laser printers are quite.

3. They can produce high quality output on ordinary papers.
4. It prints many copies before cartridge is used up.

Disadvantages

1. The initial cost of laser printers can be high.
2. Laser printers are more expensive than dot-matrix printers and inkjet printers.

2) Ink Jet printers:

An ink jet printer is a non-impact printer that forms characters and graphics by spraying tiny drops of liquid ink onto a piece of paper. Ink jet printers can produce letter quality text and graphics in both black and white and colours.

Advantages

1. They are generally quite.
2. They can produce high quality colour output.
3. Has a very high resolution

Disadvantages of ink jet printers.

1. Specialized papers are required to produce high quality colour output.
2. The ink cartridges and specialized papers are expensive.
3. The ink may smear when printed on ordinary paper.

Factors to consider when buying a printer

- 1) Resolution
- 2) Speed (Page per minute (ppm), character per second (cps))
- 3) Memory of at least 2mb
- 4) Price & Availability of the cartridge or toner
- 5) Purpose of the printer.
- 6) Running costs of the printer
- 7) Networking capability of the printer
- 8) Printer drivers.

COMPUTER SOFTWARE

Content

1. Introduction
2. Terminologies
3. Classification of software
4. **System software**
 - a) Types of system software
 - b) Functions of operating system
5. **Application software**
 - a) Types of application software

b) Uses of application software

Introduction

Computer software (software) is the set of digital instructions that control the actions of a computer. It is a series of instructions that tell the hardware how to work. The process of making software is called programming/coding, and is done by programmers.

Terminologies related to software 1)

Software Installation:

This is the process of setting up of a program on a computer to be able to use it.

2) A software suit:

This is a collection of individual application soft-ware programs sold as a single package.

3) Log on:

This is the process of entering a user name and a password into the computer.

4) Password.

This is a combination of characters associated with the user name that allow a user to access a computer, a file or a network.

5) Cryptography:

This is the art of hiding information by transforming it (encrypting it) into an unreadable format, called cipher text such that Only those who possess a secret key can interpret (decrypt) the message into plain text.

8) A user interface:

This refers to the part of the software with which you interact; it controls how data and instructions are entered and information is presented on the screen.

Software upgrade: This is the purchase of a newer version of software you currently use.

10) Software update:

This is software that provides bug fixes for features that are not working quite right and minor software enhancement.

9) 11) Trouble shooting: This is the process of diagnosing the source of the problem.

12) **A bug:** this is an error in a program

13) **Debugging:** this is the process of removing errors in a program to make it work as expected

14) Compilation:

This is the process of transforming a program in a high level language into a machine code

Characteristics of computer software

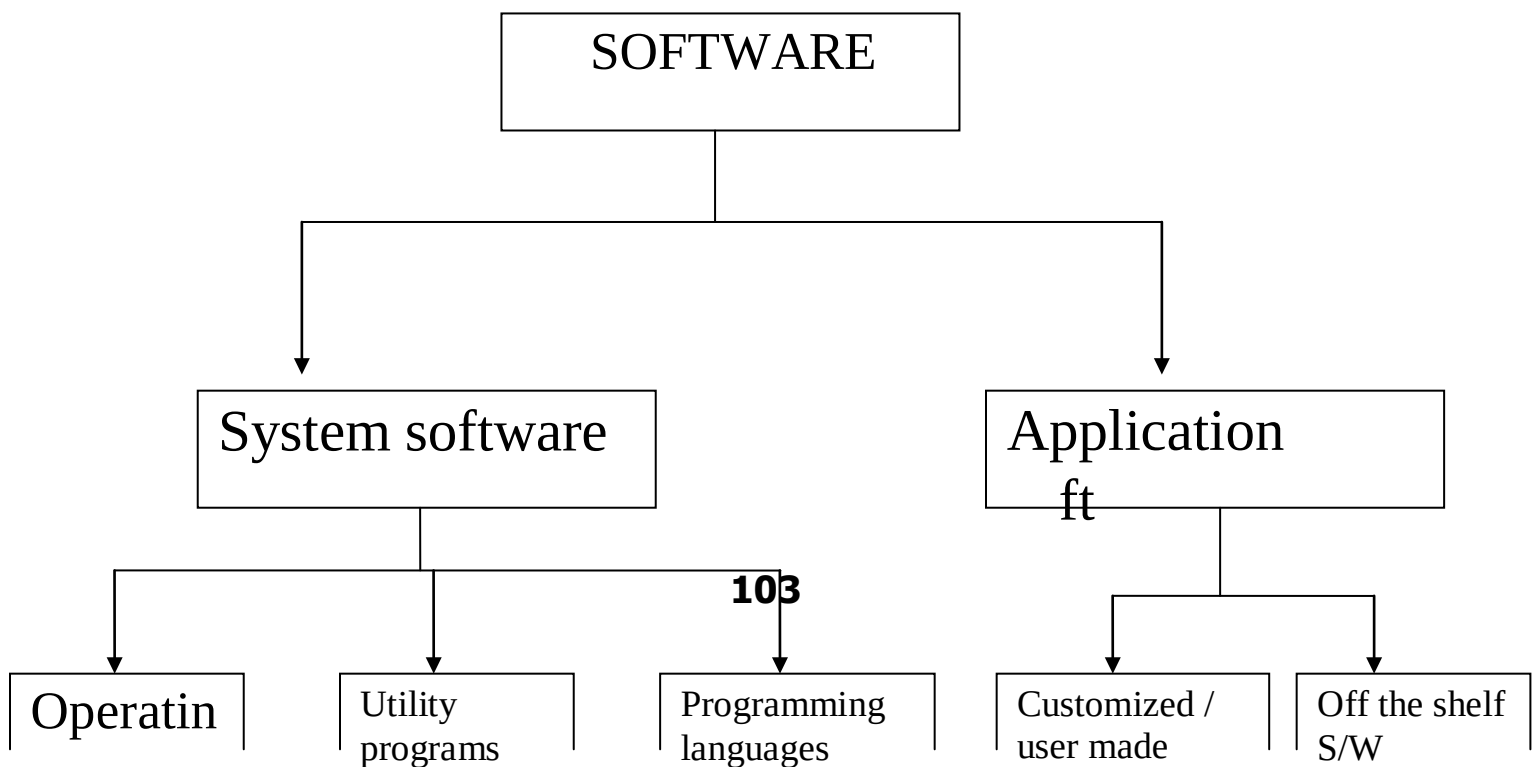
- 1) Copy righted
- 2) It can be installed on computers
- 3) Has a source code written by a programmer?
- 4) It is intangible
- 5) It gives instructions to the computer.

Classification of Software

Computer software is broadly categorized into two types i.e.;

1. System software
2. Application software

Illustration showing software Classification



SYSTEM SOFTWARE

This is software which control and manage the operations of the computer & its devices. System software serves as the interface between the user, application software and the hardware.

Types of system software

- ✦ Operating system
- ✦ Utility programs & Programming languages
- ✦ Operating system

Operating System

This is a software that controls all the operations of the computer, all its input, output and storage elements. O/S manages the computer's resources and acts as an interface between the user, the computer's hardware and other software tools.

➤ O/S relies on device drivers to manage computer devices.

A device driver is a small program that tells the operating system how to communicate with the computer devices.

Importance of device drivers

1. Device drivers facilitate detection of attached hardware devices.
2. Device drivers activate wireless network.
3. Device drivers provide an interface between hardware and software
4. Device drivers control the use of the attached device on the computer.
5. Device drivers enable installation of multiple devices at the same time
6. It contributes to stability of device performance

Examples of operating systems

1. Windows 7,
2. Windows XP,
3. Windows Vista,
4. Windows 2000,
5. Window 95,
6. Windows 98,
7. Mac OS,
8. UNIX
9. DOS. etc

Functions of the operating system

- 1) The OS provides an interface between the user and the computer.
- 2) It manages the computer processor by managing the flow of information in the computer.
- 3) It does File management; this includes keeping record of the saved files, their names, sizes, location etc.
- 4) The OS manages the shutting down of the computer.

- 5) It controls the loading and running of application programs.
- 6) It handles Errors whenever they occur.
- 7) It protects hardware and software from improper use.
- 8) It allocates system resources e.g. printers, memory etc to data and application programs
- 9) It completes the booting process of the computer.
 - 10) It administers security on files using tools like pass words.
 - 11) It controls input and output operations

Types of operating system

Operating systems are classified /categorized basing on:

- a) The types / number of computers they control.
- b) According to the number of users that can be logged in at a time.
- c) The number of tasks an operating system can perform concurrently.
- d) How users enter data and instructions into computer (user interface)
- e) The processing mode

Classification according to number of computers controlled.

- 1) Stand alone operating system
- 2) Networked operating system

1) Stand alone operating system

This is a type of operating system that runs only one machine when installed.

This type of operating system cannot support a network environment.

Examples of stand alone operating system.

1. Disk operating system (DOS)
2. Windows 95,
3. Windows 98,
4. Windows Me,
5. Windows 2000,
6. Windows XP,
7. Windows Vista,
8. Windows 7,
9. Windows 8 etc

Networked operating system

This is a type of operating system that can manage all computers when installed on one as long as the other computers are linked to form a network e.g.

- 1) Windows NT Server, 2)
- Windows Net Server

- 3) Windows 2008,
- 4) Solaris,
- 5) Novell NetWare,
- 6) UNIX server,
- 7) Linux server,
- 8) O/s 2 wrap series

Classification according to how the users enter data & instructions into the computer & how information is displayed. (user interface).

There are two types of users interfaces which include;

- A. Command line interface (CLI)
- B. Graphical user interface (GUI)

Command line interface (CLI)

This is user interface where a key board is used to issue commands to the computer.

The instructions are normally issued or typed at a command prompt. (C:\>-.) This type of operating system is referred to as command driven

Advantages of CLI

1. It takes up little memory resources to run because it is light.
2. The operations are very fast because commands can be entered directly through the key board.
3. It is precise because the user states exactly what he or she wants to do.
4. Users have much more control of their file system and operating system in a command line interface. For example, users can easily copy a specific file from one location to another with a one-line command.

Disadvantages of CLI

1. Difficult to use by new users because a command language has to be learnt and memorized.
2. CLIs cannot show images.

Graphical user interface (GUI).

This is a type of operating system that uses icon to issue (enter) commands into the computer. An icon is a graphical representation of a program or a file.

With this type of operating system, the user simply clicks on the icon to give instructions to the computer.

Features of the graphical user interface

A GUI has the following features;

1. **Windows** to enable user to multi task
2. **Icons** to help the user identify applications / folders
3. **Menus** to help the user choose options

4. **Pointing device** to click and open files/software

Nb. The acronym WIMP is used to refer to Windows, Icons, Menus and Pointing device in respect to GUI. **Advantages of GUI**

1. It is user friendly because it is easy to learn and work with.
2. There is no need to type and memorize any command language.
3. It provides a similar interface for any application.
4. GUIs have windows that enable a user easily to view, control and multitask.
5. GUI enables a user to create shortcuts on the desktop which can run a program easily.
6. GUIs generally provide users with immediate, visual feedback about the effect of each action.

Disadvantages of GUI

1. It requires more memory as well as a faster processor.
2. It occupies more disk space to hold all files for different functions.
3. The user choices are restricted to those on the menus
4. It might be slower to download into memory.
5. It might require the installation of additional software, e.g., the "runtime environment" in the case of java.

Differences between dos and windows

Dos	Windows
Takes up little memory	Requires more memory as well as a faster processor
Operation is fast because commands can be entered directly.	Depends on the strength of the computer
Commands have to be learned	User-friendly and easy to learn
Commands have to be memorized	No need to memorize commands.

Reasons for installing or reinstalling an operating system

- a) To upgrade to a more advanced operating system.
- b) When the existing operating system files have been corrupted and it therefore no longer functions.

- c) To set up a brand new machine which was supplied without an operating system.
- d) To perform a recovery on the computer after it has suffered a fatal error, when it is best to start with a clean, freshly formatted hard drive.

Factors to consider when choosing an operating system

1. The Human–computer interface
2. The Applications intended for the computer.
3. The Cost of the operating system.
4. Its availability on the market.
5. Reliability of the operating system.
6. The basic design of the computer.
7. The Hardware provisions of the computer.

2. UTILITY PROGRAMS

These are general purpose programs that enhance/ boost the performance of a computer. They are designed to configure, analyse, optimise, and maintain a computer in a normal working state. Some utility programs are included with the operating system (for example, disk repairing programs) while others are purchased separately by the user (for example, Norton Disk Doctor).

Examples of utility programs

- a) Sorting utility
- b) Merging utility
- c) Backup utility
- d) Antivirus utility
- e) Data compression utility
- f) Screen savers
- g) Scandisk utility
- h) File viewer
- i) Un installer
- j) Disk defragmenter
- j) Disk repair utility
- k) Computer language translators
- l) Disk partitioning software
- m) Disk compression utilities
- n) File managers
- o) Diagnostic utility.

FUNCTIONS OF UTILITY PROGRAMS

1. **File /data compression utility.** This is used to squeeze large files so that they can require less storage space.
2. **File Viewer:** Displays the content of a file.
3. **Sorting utility:** Takes in data and arranges it as specified by the user.
4. **Antivirus utility:** Prevents, detects and removes viruses.
5. **Merging utility:** This combines data from two or more files to form one general file
6. **Folder management utility:** This is used for creating, viewing, deleting and rearranging files and folders
7. **Compression utility:** Reduces the size of files to free disk space
8. **Antivirus utility:** This Prevents, detects and removes viruses.
9. **Uninstaller utility:** This removes programs from the computer.
10. **Cryptographic utilities:** Used to encrypt and decrypt files.
11. **Backup utility:** Used to makes a duplicate copy of every file on the hard disk which can be store on the CD or flop
12. **Disk Defragmenter:** finds fragmented files on the hard disk and organises them in a contagious manner.
13. **Diagnostic utility** Compiles technical computer information & outline any identified problems
14. **System profilers.** Provide detailed information about the software installed and hardware attached to the computer.
15. **System profilers.** Provide detailed information about the software installed and hardware attached to the computer.
16. **Network utilities:** Analyses the computer's network connectivity, configure network settings, check data transfer and log events.
17. **Scandisk:** Scans the computer disk to see if there is any potential problem such as bad disk areas, and possibly repair them.

18. **Screen saver utility.**

This is a utility program which causes the computer monitor to automatically displays a moving image (graphic) after a period when the computer is on but not in use. The original reason for introduction of Screen saver utility was to prevent phosphor burn-in (ghosting effect) of CRT and plasma computer monitors

Practical application of screen savers

Screen savers have Practical uses to a computer user which include;

1. Entertainment
2. Security
3. Advertisement

4. Source of information

3. PROGRAMMING LANGUAGES

These are sets of instructions used by programmers (users) to build, design or write other computer programs. Programming languages are commonly referred to as **system development software**.

A programming language has a unique set of keywords and a special syntax for expressing and organizing program instructions.

Syntax refers to the spelling and grammar of a programming language.

Categories of programming languages

There are two categories of programming languages

- 1) Low level programming languages
- 2) High level programming languages

a) Low level programming languages

This is the lowest possible level of language in which it is possible to write a computer program. It is a programming language which is more close to the computer native language i.e. 0s and 1s

Categories of low level programming language

- 1) Machine language
- 2) Assembly language

Machine language

This is the first generation language consisting of binary digits (strings of 0s and 1s)

In a machine language, each character is represented by binary digits (BITS) E.g. A= 01000001- ASCII

The main problems with using machine code directly are that;

- 1) It is very easy to make a mistake, and very hard to find it once you realize the mistake has been made.
- 2) It is very difficult to be under by human being

High level programming languages.

- These are programming languages that closer to human languages and further from machine languages.
- Examples of high level programming languages
 1. ADA,
 2. Algal
 3. **BASIC**
 4. COBOL
 5. C, C++
 6. FORTRAN,
 7. LISP,
 8. Pascal,
 9. Prolog.

Advantages of using high level programming languages

- i. High level language is easy to understand by programmers because it is closer to human language.
- ii. High-level programming languages are problem oriented, therefore they enable the programmer concentrate on solving the problem.
- iii. The words and grammar of high-level languages are English-like and this makes the programs more readable and easy to write.
- iv. A high-level language is machine independent Since the syntaxes of high-level languages are standardized so that they can be used on different computer systems.
- v. They are easier to read, write, and maintain.
- vi. They also permit faster development of large programs.

Qualities of a good programming language –

Suitability of the problem.

- Clarity and simplicity.
- Efficiency
- Availability
- Consistency

The above are the criteria to be used when choosing a programming language and then the platform whether windows or DOS based.

Language processors

- ☐ A language processor is a program that translates a program designed in high level programming language into a machine code.

These include;

- Compilers
- Interpreters
- Assemblers
- Debuggers

1. **Compilers:** This is a program that coverts a source code written in a high level language into a computer language as a whole.
2. **Interpreters:** is a program that coverts a source code written in a high level language into a machine language line by line.
3. **Assemblers:** these translate assembly instruction or language in machine code.
4. **Debuggers:** these are programs which remove errors from a program.

Factors considered before installing software on a computer. – Hard disk free space

- Amount of RAM
- Compatibility with the computer basic design

- Processor speed
- Compatibility with other software

The devices on which software can be installed include;

- a) Desktops
- b) Smart Phones
- c) I Pads
- d) Laptops
- e) Tablets

APPLICATION SOFTWARE

These are programs that are designed to solve specific end user needs. A computer application refers to the use of the computer to solve specific problem for the user.

Types of application software

Basing on the mode of acquisition, application software is categorized into;

1. Freeware
2. Open source
3. Shareware
4. Public Domain software
5. Off the shelf software
6. Custom made software.

1. Freeware: This is copyrighted software provided at no cost to users.
2. Open source (OSS). This is copyrighted software for which the software plus the source code are freely distributed.
3. Public Domain software. This is free software donated for public use and has no copyrighted restrictions.
4. Shareware. This is a copyrighted software that is distributed free for a trial period and payment is required for using the software beyond trial period.

5. Off the shelf software

OTS are commercial software packages that are already-made by the company to meet the needs of a wide variety of users and are sold together as a single package. This software is also called **packaged software** or **software suite** or **General purpose software**.

Examples

- MS office suite
- Computer games packages
- Education software packages

Advantages of off-the-shelf software

1. Off-the-shelf software is Cheaper because it is massively produced and packaged for commercial purposes.
2. Off-the-shelf software perform a wide range of tasks.
3. It has a lot of such as online help, books, and discussion forums to guide the users in case of any problems.
4. Off-shelf is easy to learn and use (user friendly)
5. It is easy to install.
6. It is more reliable because it is tried and well tested by many users. 7. It is Easily available from most computer vendors

Disadvantages of off-the-shelf software:

1. Off-the-shelf software is highly complex because It includes large sections that a user may never use.
2. Off-the-shelf software does not address needs of specific users.
3. It takes a longer period of time to properly learn how to use off the shelf software.
4. Off-shelf may not address some of the individual needs of the user. There will probably be operations that you require that you simply cannot do with the software.
5. It is very difficult to gain any competitive advantage from its use over business rivals because they use the same software.
6. **Custom made software.**

This is an application software which is developed at a user's request to perform specific functions. The individual user hires programmers to design such a program.

Examples of custom made software

- a) school management information systems(SMIS)
- b) Inventory management systems
- c) Payroll management systems
- d) Library management systems
- e) Report making software

Advantages of Custom-made software

1. The software also performs tasks that the general purpose software cannot perform.
2. A custom-made application directly addresses the user's needs because it is written to the user's requirements and fits in with his/her work.
3. The software developer delivers and installs the software and trains the end users in the use of the new software.
4. This kind of software can be quickly changed when the needs of the organization change, since the source code belongs to the company.

Disadvantages of custom made

- 1) It is expensive because it requires hiring a programmer to develop the software, to install and to provide on-site support and training.
- 2) Usually lacking online help services.
- 3) It takes time to acquire because of the need to get information necessary and to write the code of the new software.
- 4) It lacks online support to guide the user in case of a problem.
- 5) It requires extensive training before use
- 6) It May contain undetected programming errors/bugs since it is not tested adequately.

Examples application software

1) Word Processor

Used for producing text-based documents like letters, notes, reports, memos, etc.

2) Spreadsheet software

Used for performing calculations e.g. budgeting statistics, financial data, creating of graphs.

3) Database management software (DBMS)-

Used in the creation and management of large amount of information related to a particular topic or subject. E.g. student's details, employee pay rolls, product details, customer and supplier's information etc.

4) Presentation software:

Used for creating slide based shows which enhance a speech presentation.

5) Accounting software

Used for preparing payrolls, capturing cash inflows and outflows, generating financial statements as well as balance sheets, etc.

6) Computer aided design (CAD) software –

Used by engineers and architects to produce plans for houses, bridges, car parts, roads, etc.

7) Desktop publishing software –

This application specializes in creating cards, flyers, calendars, brochures, etc which can be useful for projects.

8) Web authoring software Used by webmasters for building websites.

9) Audio and video editing software

Used by movie editors to create and edit movies with various transitions and animations.

10) Communications software

Used for taking cyber classes, sending and receiving emails, e.g. Internet Explorer.

11) Graphics software

Used by graphic designers to design book covers, cartoons etc.

12) File Recovery software

A unique application used for recovering accidentally or just deleted files from the computer. e.g. Recover My Files.

A SOFTWARE SUITE

Application software is normally sold in a set called a suite. A software suite is a collection of individual application software programs sold as a single package.

Examples popular office software suites

- a) Lotus Smart Suite
- b) Microsoft Office
- c) Apple iWork
- d) Koffice
- e) OpenOffice.org
- f) LibreOffice
- g) WordPerfect Office
- h) Celframe Office
- i) Ability Office etc.

Advantages of buying / using software suites

1. It is cheaper in cost than buying each of the application packages separately.
2. It is easy to learn and use because applications within a suite usually use a similar interface and share common features such as clip art and toolbars.
3. Easy to install because all the various applications can be installed at once.
4. More reliable because it is tried and well tested by many users.

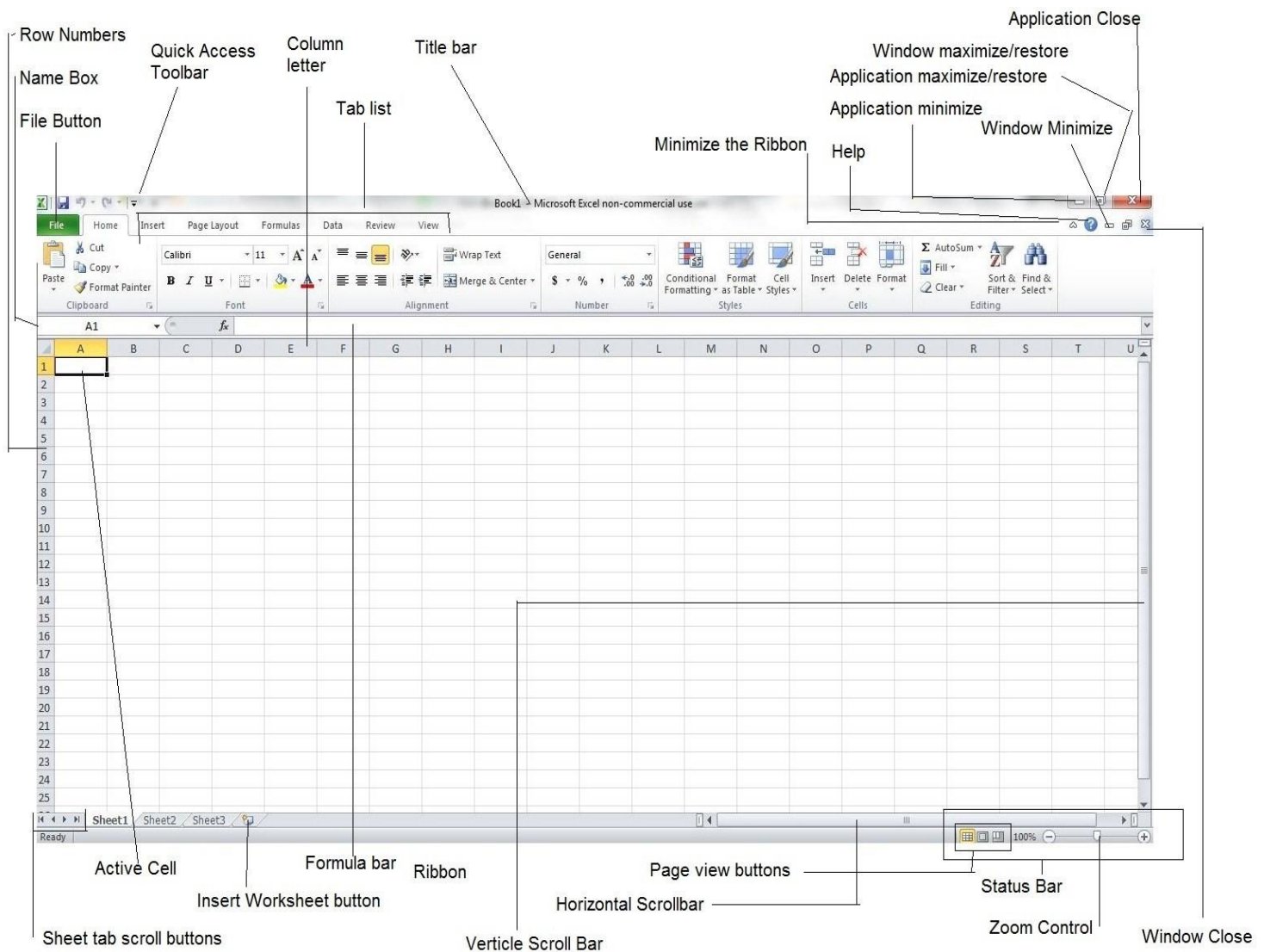
ELECTRONIC SPREADSHEET I

SPREADSHEET SOFTWARE

Spreadsheet software refers to Application software packages that are used for calculations, including the creation of graphs.

[Examples of spreadsheet software applications include:](#) Microsoft Excel, Lotus 1-2-3, KSpread, Apple Numbers, OpenOffice. org Calc, Kingsoft Spreadsheets, Quattro Pro, Ability Spreadsheet, etc.

WORKING WITH THE MICROSOFT EXCEL WINDOW



Active cell / Selected cell - An active is the cell you are currently working on. The cell with a thick outline.

Cell Reference - The column letter and the row number of a cell

A formula must always start with "=" sign and what the calculations for each cell

Grid Lines - The horizontal and vertical lines on the spreadsheet

Sheet tabs - Tabs that identify the worksheets in a workbook

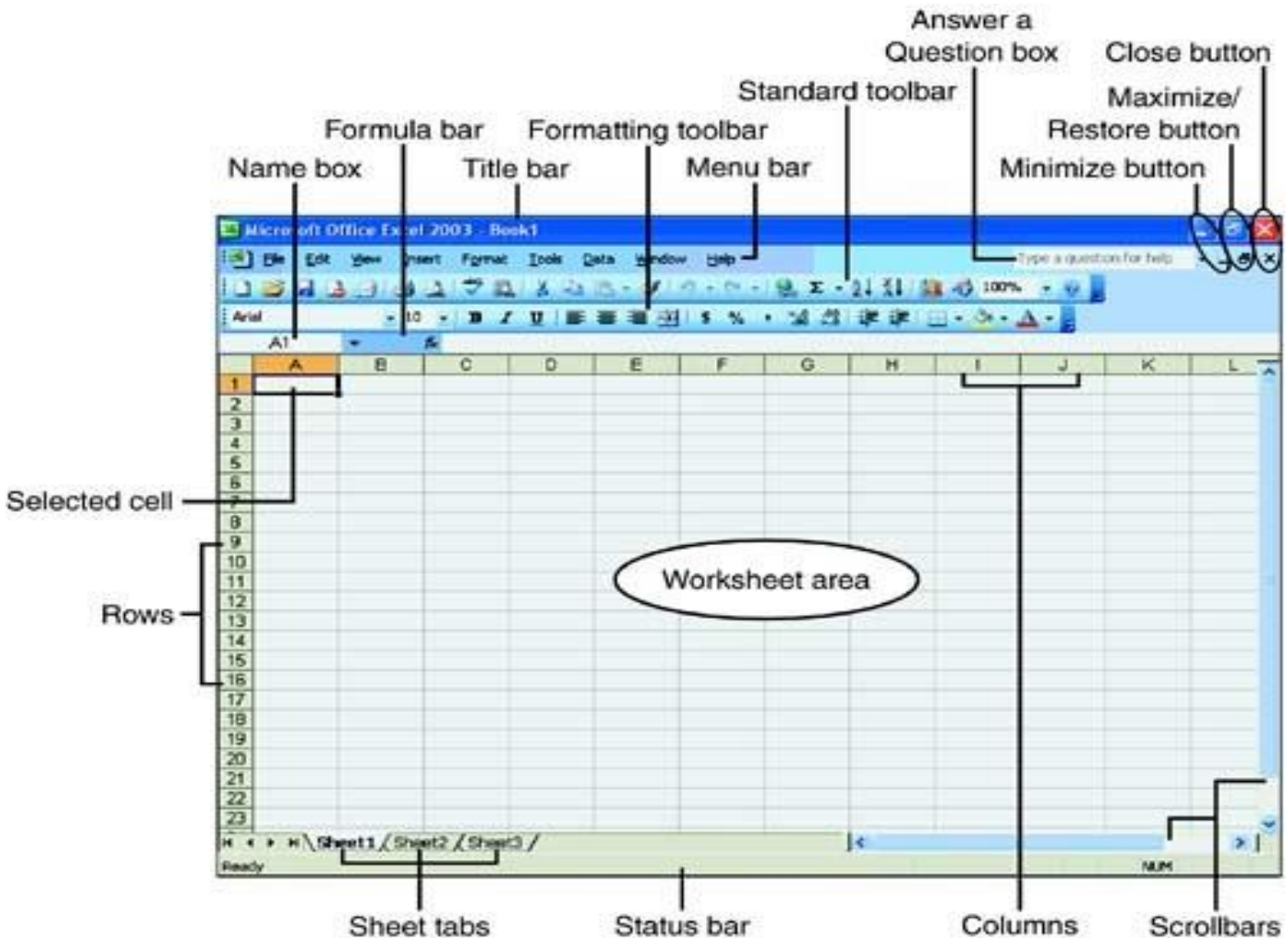
Spreadsheets - a grid that organizes data in rows and columns.

Value - A number that can be entered into a cell

Workbook - A group of many worksheets

Worksheet - One page of a spreadsheet that contains up to 65,536 rows and 256 columns

Name Box - The Name Box is located next to the formula bar above the worksheet area. The Name Box displays the cell reference of the active cell.



1. Toolbars are located at the top under the main Menu bar
2. Formula Bar is located under the toolbars
3. A single "grid", or page, is usually referred to as a worksheet. The current worksheet is the main area of the window
4. Task pane is the panel to the right of the worksheet.
5. Status bar is located at the bottom of the window
6. Columns - The vertical segments that you see on the spreadsheet are called columns.
7. Rows - The horizontal segments are referred to as rows.
8. Cells - Each box that is created from a row and column intersecting is referred to as a cell.
9. Scroll bars – A worksheet is too large. Scroll bars are used to roll or navigate to other parts of the worksheet that are not visible.

DATA TYPES THAT CAN BE ENTERED INTO A SPREADSHEET CELL

- A cell may contain (i) labels or (ii) values.
- A label is a text entry, such as TOTAL, that cannot be numerically manipulated by the spreadsheet.
- A value can be a number, a date, the answer of a formula, currency, time, percentage, fraction, a logical value, error value etc.
- If the ##### symbols appear in the cell, it means that the column is not wide enough.

ERRORS IN SPREADSHEET CELLS

If you create a formula in Excel that contains an error or circular reference, Excel lets you know about it with error messages below.

Error	Meaning
#DIV/0!	Trying to divide by 0
#N/A!	A formula or a function inside a formula cannot find the referenced data
#NAME?	Text in the formula is not recognized
#NULL!	A space was used in formulas that reference multiple ranges; a comma
	separates range references
#NUM!	A formula has invalid numeric data for the type of operation
#REF!	A reference is invalid
#VALUE!	The wrong type of operand or function argument is used
#####	This shows that the data/value doesn't occupy in the cell

ADVANTAGES OF USING ELECTRONIC SPREADSHEETS OVER MANUAL SPREADSHEETS

1. It is Easy to make changes and corrections (**to edit**) data on the worksheet.
2. Electronic spreadsheets can **quickly perform** mathematical, statistical, and financial calculations.
3. The rest of the worksheet is **recalculated** whenever data in one place changes.
4. Spreadsheets have in-built **functions** and macros which make work easy.
5. Calculations are always **accurate**, provided that the data and formulae entered are correct.
6. They offer different options of data presentation by using charting tools such as pie charts, bar graphs, etc.
7. They are very useful for applications that require modeling and **what-if analysis**. When you revise the contents of one or more cells in a worksheet and observe the effect this change has on all the other cells, you are performing a what-if analysis.
8. They easily filter, sort, and arrange data in alphabetical order for better organization.
 1. Workbooks can be saved in **soft copies** that can be easily modified and reused in future.
 2. Electronic spreadsheets are much larger than manual worksheets. They are not limited by paper size like in manual workbooks.

DISADVANTAGES (DEMERITS) OF USING ELECTRONIC SPREADSHEETS

1. Electronic spreadsheets require special software and hardware which is **expensive**.
2. Spreadsheets require enough time for **training** and practicing before use.
3. There is a lot of **complexity** surrounding formulas, functions and their arguments.
4. Computers can get system errors, and **virus infections**. These problems also can lead total loss of data.
5. Electronic spreadsheets cannot be used in areas **without Electricity**.
6. There is Difficulty in **finding Data Mistakes** since Electronic spreadsheets have many fields, making it look like a screen full of small boxes.
7. **Difficult printing**: Obtaining hard copies becomes very hard especially when the worksheets are too wide as compared to the available page sizes.

FEATURES OF A SPREADSHEET APPLICATIONS

- 1. Saving.** Saving enables a user to create a file for the workbook in a directory on the disk. The Save command can be accessed from the File menu. NB: **The file extension of an Excel document is .xls**
- 2. Columns and Rows.** A spreadsheet is a grid consisting of columns and rows. Rows are labeled with numbers, and columns are labeled with letters, giving each cell a unique address consisting of a number and a letter.

3. Auto Complete feature. The AutoComplete can speed up data entry, especially if you have to enter a particular word or phrase repeatedly.

When you start entering data into an empty cell, directly below an existing list, Excel will automatically offer you a match from the data above it.

4. Formulas. Formulas are used to express mathematical relationships between cells. For example, $C1=A1+B1$ would add and display the sum of cells A1 and B1 into cell C1. It could also be a simple mathematical formula, such as $(100 * 3) / 40$. Formulas are not displayed on spreadsheets. What you see in the cell is the result of the formula. Don't forget about order of operations (BEDMAS); anything inside parenthesis happens first, followed by Exponent (^) Division (/) multiplication (*), followed by addition (+) and subtraction (-).

5. Functions. Functions are used as shortcuts when performing mathematical calculations. Functions are pre-programmed formulae that give power and flexibility to spreadsheet calculations. They prevent the user from having to continually enter long and cumbersome formula expressions. They constitute standard keywords and syntax. Some examples are SUM, AVERAGE, MAX, and MIN.

6. Cell References / Addresses. You can refer to a Cell by using the Column letter and Row number. For Example, D8 refers to a cell in Column D and Row 8. In this case, D8 is known as the Cell Reference and is also used as the default name for the cell.

A **Circular reference** occurs when a formula refers back to its own cell. For example inserting the formula $=A2+A3$ in cell A2 creates a circular reference.

RELATIVE, ABSOLUTE and MIXED CELL REFERENCES

RELATIVE REFERENCE: a relative reference is a cell address that changes when it is copied to other cells in a spreadsheet. This is because it is based on the relative position of the cell.

Example: If in the cell C3 we have the formula $=A1+B2$, and we copy the formula to cell E8, then it would automatically adjust to $=C6+D7$.

ABSOLUTE REFERENCE: An absolute cell reference is a cell address that does not change when it is copied to other cells in the spreadsheet. Absolute references always refer to cells in a specific location. To make a cell address absolute, we insert the dollar symbol \$ before the letter that identifies the column and before the number that identifies the row, example B1 becomes \$B\$1. If you copy the formula across rows or down columns, the absolute reference does not adjust. Example:

Example: If in the cell C3 we have the formula $=\$A\$1+\$B\2 , and we copy the formula to cell E8, then it would remain the same $=\$A\$1+\$B\2 .

MIXED REFERENCE: is when you have either: an absolute column and a relative row e.g. $\$B1$ or a relative column and an absolute row e.g. $B\$4$. And if the cell address is copied to other cells, the relative argument changes and the absolute part does not change.

Example: If in the cell C3 we have the formula $=\$A1+B\2 , and we copy the formula to cell E8, then it would automatically adjust to $=\$A6+D\2 **Note:** An easy way to add the dollar signs to a cell reference is to edit a cell reference and then press the F4 key on the keyboard.

7. Ranges. A range is a combination of two or more adjacent cells in a worksheet

1. You can refer to a range by using the cell reference of the top – left and bottom- right cells.
2. For example, B2:D8 defines the rectangular range bound at the top left by the cell B2 and at the bottom – right by the cell D8

8. Custom names for cells and ranges. Identifying a particular cell (or range of cells) is made easier when it is given a unique name. Names are easier to remember than default cell references since they can be specific to the task being worked upon

3. Names make it easier to change the structure of the sheet.
4. Named cells/ranges can be referred to from other sheets easily.
5. It is easy to go to a named range or cell using F5.

9. Graphs and charts. A Graph or Chart is a graphical representation of Data in a spreadsheet. These graphics, which illustrate the meaning of the numbers in the spreadsheet in different ways, can be used to stimulate interest and help make a point.

- There are several different types of graphs that can be made. Area graphs, bar and column graphs, line graphs, pie charts, scatter plot diagrams and 3-D graphs are some examples.

Other Features

- 10.** Multiple worksheets
- 11.** Inserting/deleting columns and rows
- 12.** Cell formats (Numbers, Strings, Currencies, Dates, Times)
- 13.** Cell merging (rows and columns)
- 14.** Cell locking
- 15.** Custom styles for columns, rows and column groups
- 16.** Delete text: Allows you to erase characters, words, charts, or worksheets as easily as you can cross them out on paper.

- 17.** Cut and Paste: Allows you to remove (cut) a section of text from one place in a spreadsheet and insert (paste) it somewhere else.
- 18.** Copy: Allows you to duplicate a section of text.
- 19.** Search and Replace: Allows you to direct the spreadsheet to search for a particular word or phrase. You can also direct the spreadsheet application to replace one group of characters with another everywhere that the first group appears.
- 20.** Headers, Footers, & Page Numbering: Allows you to specify customized headers and footers that the spreadsheet file will put at the top and bottom of every worksheet. The spreadsheet automatically keeps track of page numbers so that the correct number appears on each page.
- 21.** Spell Checker: A utility that allows you to check the spelling of words in a spreadsheet file.
- 22.** Print: Allows you to send a spreadsheet file to a printer to get a hardcopy or many hardcopies as you would like.
- 23.** Graphics: The spreadsheet application permits the addition of various types of graphics, such as bar charts, line charts, clip art, and photographs.
- 24.** Data Sort
- 25.** Macros – Allow a user to record or save a sequence of keystrokes or instructions that can be run later.
- 26.** Recalculation
- 27.** Zooming Worksheet view
- 28.** Alignment, Wrap Text, etc.

Excel Common Functions Checklist

FUNCTION NAME	FUNCTION SYNTAX	FUNCTION DESCRIPTION
AVERAGE	=AVERAGE(C1:C4)	Find the average (mean) of a list of numbers.
CONCATENATE	=CONCATENATE(B1,B2)	Joins contents of cells together
CONVERT	=CONVERT(68, "F", "C")	Converts 68 degrees Fahrenheit to Celsius (20)

COUNT	=COUNT(B4:B12)	Counts the number of cells which have a number in them
COUNTBLANK	=COUNTBLANK(B7:B13)	Counts the number of empty cells
COUNTIF	=COUNTIF(B2:B6,12)	Counts the number of cells which have a 12 in them
DEC2BIN	=DEC2BIN("19")	Converts a decimal number 19 to binary
HEX2OCT	=HEX2OCT("3B4E")	Converts hexadecimal 3B4E to octal
IF	=IF(logical_test, [value_if_true], [value_if_false]) e.g. =IF(A2<=50,"PROMOTED","CHOPPED")	Records PROMOTED if the number in cell A2 is less than or equal to 50 Otherwise, the function displays CHOPPED
INT	=INT(B1)	Records the whole number part of a

		number e.g 3.15 becomes Integer 3
LARGE	=LARGE(B3:B13,2)	Gives the 2 nd largest number
LOG	=LOG(8, 2)	Returns the Logarithm of 8 with base 2
LOWER	=LOWER(A2)	Converts text string to Lower case

MAX	=MAX(A2:A6)	Largest of the numbers in the range A2:A6
MEDIAN	=MEDIAN(A2:A6)	Median of all the numbers in the range A2:A6
MIN	=MIN(A2:A6)	Smallest of the numbers in the range A2:A6
MODE	=MODE(A2:A6)	Returns the commonest or most frequently occurring number in the range A2:A6
NOW	= NOW()	Returns the serial number of the current date and time
OCT2BIN	=OCT2BIN(67)	Converts an octal number 67 to binary
POWER	=POWER(2,4)	Returns 2 raised to the power of 4 i.e $2 \times 2 \times 2 \times 2 = 16$
PRODUCT	=PRODUCT(A2:A4)	Multiplies the numbers in cells A2 through A4.
PROPER	=PROPER(A2)	Proper case of first string (this is a TITLE =This Is A Title)

RANK	=RANK(NUMBER,REF,[ORDER]) =RANK(A3,A2:A6,1)	e.g. Gives the Rank (Position) of A3 out of the values in the range A2:A6, in ascending order
ROMAN	=ROMAN(B2)	Converts the value in cell B2 to roman numerals
ROUND	=ROUND(B3,2)	Rounds value in B3 to 2 decimal places
ROUND	=ROUND(2.15, 1)	Rounds 2.15 to one decimal place
SMALL	=SMALL(B3:B13,2)	Gives the 2 nd smallest number
SQRT	=SQRT(16)	Square root of 16
SUM	=SUM(C1:C4)	Adds a list of numbers
TODAY	=TODAY()	Returns the current date.
UPPER	=UPPER(A2)	Converts text to Upper Case (CAPITAL LETTERS)

COMMON SPREADSHEET KEYBOARD SHORTCUTS

Home	To the first cell in the current row
Ctrl + Home	To the first cell in the current sheet
Ctrl + End	To the last cell containing data

Page Up	One screen up
Page Down	One screen down
Alt + PgUp	One screen to the left
Alt + PgDown	One screen to the right
F5 or Ctrl + G	Display Go to Dialogue Box
Ctrl + F4	Close Workbook
Alt + F4	Exit Application
Shift + F11	New Workbook
Ctrl + Semicolon (;)	Enter Current Date
Ctrl + Shift +Enter	Fill a range of cells with same data
TAB	Moves one cell to the right in a worksheet.
ESC	Cancels an entry in the cell or Formula Bar.
F1	Displays Help
F2	Edits the active cell and positions the insertion point at the end of the cell contents.
F5	Displays the Go To dialog box
F6	Switches between the worksheet, ribbon, task pane, and Zoom controls.
F7	Displays the Spelling dialog box to check spelling in the active worksheet or selected range.
F8	Turns extend selection mode on or off.

F9	Re Calculates all worksheets in all open workbooks.
F11	Creates a chart of the data in the current range in a separate Chart sheet.
F10	Turns key tips on or off. (Pressing ALT does the same thing.) CTRL+F10 maximizes or restores the selected workbook window.
F12	Displays the Save As dialog box.

Ctrl Key Combinations For Microsoft Excel 2010

Key	Description
CTRL+SHIFT+(	Unhides any hidden rows within the selection.
CTRL+SHIFT+&	Applies the outline border to the selected cells.
CTRL+SHIFT_	Removes the outline border from the selected cells.
CTRL+SHIFT+~	Applies the General number format.
CTRL+SHIFT+\$	Applies the Currency format with two decimal places (negative numbers in parentheses).
CTRL+SHIFT+%	Applies the Percentage format with no decimal places.
CTRL+SHIFT+^	Applies the Scientific number format with two decimal places.
CTRL+SHIFT+#	Applies the Date format with the day, month, and year.
CTRL+SHIFT+@	Applies the Time format with the hour and minute, and AM or PM.
CTRL+SHIFT+!	Applies the Number format with two decimal places, thousands separator, and minus sign (-) for negative values.

CTRL+SHIFT+*	Selects the current region around the active cell (the data area enclosed by blank rows and blank columns). In a PivotTable, it selects the entire PivotTable report.
CTRL+SHIFT+:	Enters the current time.
CTRL+SHIFT+"	Copies the value from the cell above the active cell into the cell or the Formula Bar.
CTRL+SHIFT+Plus (+)	Displays the Insert dialog box to insert blank cells.
CTRL+Minus (-)	Displays the Delete dialog box to delete the selected cells.
CTRL+;	Enters the current date.

CTRL+`	Alternates between displaying cell values and displaying formulas in the worksheet.
CTRL+'	Copies a formula from the cell above the active cell into the cell or the Formula Bar.
CTRL+1	Displays the Format Cells dialog box.
CTRL+2	Applies or removes bold formatting.
CTRL+3	Applies or removes italic formatting.
CTRL+4	Applies or removes underlining.
CTRL+5	Applies or removes strikethrough.
CTRL+6	Alternates between hiding and displaying objects.
CTRL+8	Displays or hides the outline symbols.
CTRL+9	Hides the selected rows.
CTRL+0	Hides the selected columns.

CTRL+A	Selects the entire worksheet. If the worksheet contains data, CTRL+A selects the current region. Pressing CTRL+A a second time selects the entire worksheet. When the insertion point is to the right of a function name in a formula, displays the Function Arguments dialog box. CTRL+SHIFT+A inserts the argument names and parentheses when the insertion point is to the right of a function name in a formula.
CTRL+B	Applies or removes bold formatting.
CTRL+C	Copies the selected cells.
CTRL+D	Uses the Fill Down command to copy the contents and format of the topmost cell of a selected range into the cells

	below.
CTRL+F	Displays the Find and Replace dialog box, with the Find tab selected. SHIFT+F5 also displays this tab, while SHIFT+F4 repeats the last Find action. CTRL+SHIFT+F opens the Format Cells dialog box with the Font tab selected.
CTRL+G	Displays the Go To dialog box. F5 also displays this dialog box.
CTRL+H	Displays the Find and Replace dialog box, with the Replace tab selected.
CTRL+I	Applies or removes italic formatting.

CTRL+K	Displays the Insert Hyperlink dialog box for new hyperlinks or the Edit Hyperlink dialog box for selected existing hyperlinks.
CTRL+L	Displays the Create Table dialog box.
CTRL+N	Creates a new, blank workbook.
CTRL+O	Displays the Open dialog box to open or find a file. CTRL+SHIFT+O selects all cells that contain comments.
CTRL+P	Displays the Print tab in Microsoft Office Backstage view. CTRL+SHIFT+P opens the Format Cells dialog box with the Font tab selected.
CTRL+R	Uses the Fill Right command to copy the contents and format of the leftmost cell of a selected range into the cells to the right.
CTRL+S	Saves the active file with its current file name, location, and
	file format.
CTRL+T	Displays the Create Table dialog box.
CTRL+U	Applies or removes underlining. CTRL+SHIFT+U switches between expanding and collapsing of the formula bar.
CTRL+V	Inserts the contents of the Clipboard at the insertion point and replaces any selection. Available only after you have cut or copied an object, text, or cell contents. CTRL+ALT+V displays the Paste Special dialog box. Available only after you have cut or copied an object, text, or cell contents on a worksheet or in another program.

CTRL+W	Closes the selected workbook window.
CTRL+X	Cuts the selected cells.
CTRL+Y	Repeats the last command or action, if possible.
CTRL+Z	Uses the Undo command to reverse the last command or to delete the last entry that you typed.

INTERNET & WORLDWIDE WEB



• Content

1. Introduction to internet

- a) Meaning of internet
- b) Implications of internet

2. Internet services

- a) Internet communication services
- b) E mail services
- c) Netiquette

3. World Wide Web

- a) Web browsers
- b) Search engines
- c) Web sites
- d) Cloud computing

Introduction to internet

a) Meaning of internet

Internet is the worldwide collection of interconnected networks that support communication and information exchange. Internet can also be defined as the worldwide collection of networks linked together.

b) Implications of internet Advantages of the internet

1. Allows faster communication by use of emails, face book etc
2. Provides education and online courses
3. Provides entertainment and leisure such as online games and music, magazines and vocation training guides.
4. Provides abundant information resource for easy research
5. Provides online banking services and manages investments
6. Allows downloading of files, listening to music and watching sports.

Disadvantages of internet.

1. Promotes immorality
2. Spamming
3. Addiction
4. Pornography
5. Social isolation
6. Obesity
7. Malware threats

INTERNET SERVICES

a) Internet communication services include; 1.

World Wide Web

2. E-mail
3. Video conferencing
4. Internet telephony
5. News groups
6. Message boards
7. Mailing list
8. Chat rooms
9. Instant massaging

1. **The World Wide Web (WWW) or Web.** This is the worldwide collection of electronic documents (web pages)

2. **E-mail:** This is the transmission of a message via a internet.
3. **News groups / discussion group.** This is an online area where users conduct online discussions about a particular subject.
4. **Message boards:** This is a web-based type of discussion group that does not require a newsreader program
5. **Video conferencing.** This is meeting between two or more geographically isolated people who use the internet to transmit audio and video data.
6. **Mailing lists.** This is a group of e-mail names & addresses given a single name. when a message is sent to a mailing list, every person on the list will receive a copy of the message.
7. **Chat rooms.** This is a location on the internet server that permits users to chat with each other by typing a line of text on the computer.
8. **Internet telephony (Voice over IP).** This is a web based telephone service that allows a user to talk to others for just a cost of the internet connection.
9. **Instant messaging.** This is a real time communication service that notifies a user when one or more people are online & then allows the user to exchange messages/ files with them.

VIDEO CONFERENCING



Videoconferencing is the conduct of a session/discussion using a set of telecommunication technologies which allow two or more locations to communicate by simultaneous two-way real time video and audio transmissions. Video conferencing is mostly used in business, education, medicine and media. It reduces the need to travel to bring people together.



E-MAIL SERVICES

An e-mail is a message sent over a network.

Examples of popular email software include:

1. Microsoft outlook express
2. Endora

- This is the standard that encodes email attachments into text form at the senders and then decodes them back to their original format at the receiver's end is called MIME (Multipurpose Internet Expansion). In order for one to send an email, he requires to have an email address. e.g. frankizza20@yahoo.com **Anatomy of the email address.**

An email address consists of two parts i.e. the username and the domain name. These are separated by "at" @ sign.

User name: this is the title of the individual or group of the individual operating the email account

The domain name: the domain name consists of the following parts;

Server: this the computer managing the email addresses. e.g. yahoo, EarthLink, hotbot. etc
Company nature that manages the email services e.g.

TLD Abbreviations	Type of Domain
.com	Commercial organizations, business & companies

.org	Non-profit organization
.net	Network providers
.edu	Educational institutions
.gov	Government agencies
.mil	Military organizations

Basics of sending and receiving an email. To

send and receive an email, one needs to have;

1. An email account.
2. Email software

An Email account is got either from the ISP or an online service provider like yahoo. After acquiring the above, the online email/ service provider e.g. yahoo automatically creates you an email account interface which requires you to declare your user name and the password.

Features of an email account

After successful signing in, the email service provider automatically provides your account with features like:

1. Inbox for incoming messages
2. Outbox for outgoing messages
3. Address book for storing your personal email address etc

Sending emails

The service provider avails an option for the user to be able to create and send an email message. This is normally interfaced by tabs like "compose", new etc. **Basic components of a sending window.**

1. To: Holds the recipient's email address
2. CC: (Carbon Copy). This sends a copy of email to other recipients & makes them aware that it was sent to others and even posts the sender's address.
3. BCC: (Blind Carbon Copy): Sends a copy without telling the recipients that the same copy was sent to others.
4. Subject: this is where the sender enters the name/ title of the message to be sent.
5. Text area: This is the main area where the user enters/ types text to be sent as the main mail.
6. Attachment: This is the area that enables the user to link non textual documents eg photos, music, videos etc. to the email message to be sent together.
7. Send: This is the tab that issues instructions to client's email software to post the message

What to consider when using email

-  Email can be junk mail. so avoid unnecessary proliferation of messages.
-  Email takes up computer space, so delete messages you no longer need.
-  The integrity of an email message cannot be guaranteed. If a received message seems out of character for the sender, double-check before taking it seriously.
-  Take care opening attachments. treat any attachment you receive with suspicion unless you expect.

Benefits/advantages of using email

- Its quick; e mail takes seconds to send compared to snail mail.
- It's cheap. Compared to posting or faxing messages
- The same message can easily be sent to many recipients at once by use of a mailing list.
- Messages can be replied to or forwarded with speed and ease because the software automatically inputs the address of the sender.
- Other files can be sent as attachments which has increased the popularity of email in business.
- it is convenient because a message can be sent anywhere in the world without having to leave one's desk.
- E-mail can be used by businessmen to sent advertisements to potential customers.
- It is possible to send multimedia content as e-mail.
- The sender is informed in case the email is not send so that is able to find other ways of delivering the message.
- A copy of the message is kept

Disadvantages of e-mail

- ☐ The sender and receiver both need internet access and e-mail accounts-most people in Uganda do not have access to e-mail.
- ☐ The hardware needed is expensive
- ☐ Email will not be delivered if there is a small error in the address.
- ☐ Some people are not keen on checking their mail boxes. So an urgent message may not be read in time.
- ☐ There is a large volume of unsolicited e-mail known as 'spam' that tends to fill up mailboxes.
- ☐ E-mail tends to take peoples valuable time at the expense of work or study.
- ☐ Parcels cannot be delivered via e-mail which limits its usability.
- ☐ Most viruses are spread via email.

The privacy of an email message cannot be guaranteed. So confidential messages ought not sent via e-mail.

NETIQUETTE

This refers to the user's guide to the polite way you use the web and emails on the internet and intranet. This refers to rules and ethics for responsible use of the Internet. It also refers to the code of conduct to follow while on the Internet.

Some of the rules include:

- ✦ Think about the social consequences of the program you are writing or the system you are designing.
- ✦ Remember that any one on the Internet can read your posting.
- ✦ Be aware of forging
- ✦ Do not hide your identity
- ✦ Avoid entering into stupid arguments over stupid ideas.
- ✦ Do not forward chain letters
- ✦ Never send unsolicited junk mails
- ✦ Respond to your recipients and do not waste people's time for long private messages.
- ✦ Respect your audience and do not waste people's time with idle nonsense.
- ✦ Being online does not mean or turn you less than what you are.
- ✦ Never do any thing online that you could not do in real life.
- ✦ Keep messages and postings, remarks short and relevant to the current subject.

THE WORLD WIDE WEB

This is the global collection of web sites and web pages which are hyperlinked containing text, graphics, sound and video. There are virtually no regulations regarding the content of the WWW, so any one with appropriate software and hardware can create a web site on any topic. Consequently there are millions and millions of pages of information covering every conceivable topic.





Web browsers

A web browser is an application software used to access and view web pages.



Examples of web browsers:

- | | |
|-----------------------|------------------|
| 1. Internet explore | 6. Google chrome |
| 2. Mozilla fire fox | 7. SeaMonkey |
| 3. Amaya | 8. Opera |
| 4. K-meleon | 9. Safari |
| 5. Netscape navigator | 10. Maxthon |

Search engines

A Search engine is a software program that can be used to find websites, web pages and files on the internet. To find a website, a user just enters a word or a phrase called the keywords or search text.



Examples of search engines

- Google
- Hotbot
- Lycos
- Exite
- Yahoo

- Web sites

Types of websites

1. Static websites
2. Dynamic websites
3. E-commerce websites or online shopping site
4. Personal websites
5. Blogs
6. Informative website
7. Entertainment portal
8. Social networks.

- **Static websites:** these are often small websites which contain stationary information. They usually contain texts, images, simple navigation menus.
- **Dynamic websites:** these are typically larger websites that is data base driven. They contain hundreds of web pages with huge amount of different content.
Dynamic web pages get information from a data base and can be customized frequently and automatically according to the user's specific needs.
- **E-commerce websites or online shopping site:** These are a type of websites where you can purchase goods or services online. They are mainly built and designed to solve the user's business needs and make money.
- **Personal website;** These contain information about an individual or group of hobbies, interests, life, events and other personal thoughts photos etc.
- **Information websites:** these are designed to deliver information in an educational way to teach users on various topics. They developed and designed in form of encyclopedias, online guides, article catalogues, information brochures etc. e.g. wikipedia.com and about.com
- **Entertainment portals, social networks:** these are websites where people share ideas, communicate, make and meet friends on line. E.g. Facebook Entertainments portals are often large websites containing entertainment news, online games, music, videos and different types of fun and exciting content.
- **Social networking website.** This is a type of website where users can seek others who share their interests, find out what's going on in their areas of concern, and share information with one another.

Examples of social networking websites

1. Facebook
2. Twitter
3. Google Plus, etc.

Disadvantage of social networking websites •

They are addictive.

- They are not regarded as formal
- In case one forgets his/her password, signing in is not possible and this can lead to loss of information.
- Social Networks may violate privacy in case someone else gets to know your user password.
- Misinterpretation: One has to be careful while posting any kind of information on social networks. If typed in a hurry, the matter could be misinterpreted.
- Junk Messages: Social Networks are used a lot to send unsolicited messages and unwanted advertisements.

CLOUD COMPUTING

This is a service offered on the network by a collection of servers. The practice of storing regularly used computer data on remote servers that can be accessed via the internet for easy update and retrieval. These computers/cloud of computers enable the users visiting to have access to much faster servers, be able to access programs and services from anywhere within internet access often without having to install other software and get access to the services from any device capable of reaching the network or internet.

Examples of websites that offer cloud computing services.

1. Amazon web services (AWS)
 2. Dash lane an online password service
 3. Google app engine
 4. Google docs
 5. Online backup
 6. Windows azure
 7. Websites such as Facebook. Picasa & YouTube
1. Amazon web services (AWS) provides a variety of cloud computing services.
 2. Dash lane is an online password service that manage passwords between all devices.
 3. Google app engine a service that enable users to create scalable web services that use Google resources.
 4. Google docs is a free solution from google that allows one to open Microsoft documents as well as share them with other users within internet access.
 5. Online backup is an online service that allows you to store your important information offsite. E.g. Mozy and Dropbox
 6. Windows azure is Microsoft cloud computing service that allows companies to develop & run services from their cloud.
 7. Websites such as Facebook. Picasa & YouTube

RELEVANCE CLOUD COMPUTING

1. It provides free storage space.

2. It avails information where you are provided you have internet.
3. It safeguards your data from getting lost due to disk crash.
4. It provides a backup storage.
5. Reduces cost in terms of hardware requirements for storage.

WORD PROCESSING II

CONTENT

- Page layout
- Data tabulation
- Use of objects
- Document accuracy
- Mail merge
- Document referencing and printing

Emphasis is put on practical lessons

ELECTRONIC PRESENTATION

A presentation program is a computer software package used to organize and display information, normally in the form of a slide show. **Examples of Presentation Software include:**

- ❖ Microsoft Power Point
- ❖ OpenOffice Impress
- ❖ Show Logic
- ❖ K Presenter
- ❖ Screencast
- ❖ Adobe Persuasion,
- ❖ AppleWorks, etc.

What is PowerPoint?

- PowerPoint is an application for creating presentations that can be output as
- 35mm slides,
- Paper overheads,
- Directly from the computer monitor, or ■ Printed as handouts or speaker notes .

Common terms in presentations

- [Add-in](#)
An add-in is a small add-on program to enhance an existing program.
- [Ambient Light](#)
Ambient light is the available light in a room, whether by natural or mechanical sources.
- [Animated GIF](#)

An animated GIF is a graphic file type that is composed of many different images on top of each other. Together these images are compressed and work together, creating movement, and give the appearance of a mini movie.

- [Animation](#)

In Microsoft PowerPoint, animations are visual effects applied to individual items on the slide such as graphics, titles or bullet points.

- [Animation Scheme](#)

Animation schemes in PowerPoint allow you to apply formatting to bulleted items and titles from a variety of animation groupings, such as Subtle, Moderate and Exciting, rather than making the settings individually.



- [Applet](#) An applet is a small add-on program to enhance an existing program written in the Java programming language.

- [Batch File](#)

Batch files are short user generated programs created to accomplish repetitive tasks easily.

- [Bullet](#)

Bullets are small dots, squares, dashes or graphics that begin a short descriptive phrase

- [Clip](#) - video or movie is a small section of a larger video presentation. A series of
- [video frames](#) are run in succession to produce a short, animated video. This compilation of video frames results in a video clip.

- [Contextual Tabs and Menus](#)

Contextual tabs and menus appear when an object is selected. These contextual tabs contain information or options pertinent to that object only.

- [Custom show](#)

A custom show in PowerPoint is a group of slides selected from a larger presentation to present as a smaller presentation, without having to recreate a new presentation from scratch.

- [Default Design Template](#)

The default design template is the plain, white slide template in a new Microsoft PowerPoint presentation.

- [Design Template](#)

Design templates in Microsoft PowerPoint create a presentation that has a cohesive look. All slides are part of a coordinated package.

- [Design Theme](#)

Design themes make it easy to coordinate your PowerPoint presentation with colors, graphics and fonts that all work together to create a mood for your presentation.

- [File Extensions](#)

File extensions, for any files, are the three letters at the end of the filename after a dot.

- [Hotspot](#)

The area on an image map that is used as a hyperlink to another action or location.

- [Hyperlink](#)

Hyper linking allows the viewer to quickly access another location -- be it another Web site, a slide in a presentation, or link to another file

- [Image Map](#)

A graphic object that has many hotspots or invisible hyperlinks to other objects or websites.

- [Invisible Button](#)

An invisible button or hotspot is an area of a PowerPoint slide or part of a slide that when clicked, sends the viewer to a different slide in the presentation.

- [Layout](#)

The slide layout in PowerPoint is the arrangement of all the items that make up your slide, such as title, graphics or text boxes. B



■ [Lumens](#)

A projector emits light that produces the image on the screen. The amount of light produced is measured in lumens

■ [Invisible Hyperlink](#)

An invisible hyperlink or invisible button is an area on a PowerPoint slide or part of a slide that when clicked, sends the viewer to a different slide in the presentation

■ [Macro](#)

A macro is a series of commands to automate a repetitive task, are recorded and assigned to a keystroke combination.

■ [Master Slide](#)

The Master Slide is the design template used for the slides within your presentation. There are four different master slides -- title master, notes master, handout master and the most common, the slide master

■ [Normal View](#)

Normal View in Microsoft PowerPoint is the main working window in the presentation. The slide is shown full size on the screen.

■ [Optimize Photos](#)

Optimizing is a term used to indicate a change to a photo or a graphic such as clip art, to reduce it in both visual size and file size, for use in other programs.

■ [Outline View](#)

Outline View shows all the text of all slides, in a list on the left of the PowerPoint screen. No graphics are shown in Outline view

[Plug-In](#)

A plug-in is a small add-on program to enhance an existing program written in the Java programming language.

■ [PowerPoint Viewer](#)

The PowerPoint Viewer is a small plug-in program from Microsoft that allows a PowerPoint presentation to be played on any computer.

■ [Ppt](#)

Ppt is the [file extension](#) used for PowerPoint files.

■ [Radio Button](#)

A radio button is a small circle beside an option that you may choose.

■ [Resolution](#)

Resolution is the image created as a result of the number of pixels or dots used.

This can be on a computer monitor or a setting on a digital camera

■ [Selection Handles](#)

- Selection handles surround the border of a graphic object and indicate to the user and the program that the object is currently selected and ready for something further to happen.
- [Slide](#)
A slide is a single page of a digital presentation created in presentation software programs such as PowerPoint and OpenOffice Impress.
- [Slide Layout](#)
The slide layout in PowerPoint is the arrangement of all the items that make up your slide, such as title, graphics or text boxes.
- [Slide Master](#)
The slide master in PowerPoint is a template that contains preset layouts, colors and fonts for PowerPoint presentations.
- [Slide Show](#)
A slide show is the presentation of all the digital slides created in programs such as PowerPoint and OpenOffice Impress, shown one after the other, just as on a slide projector of old.
- [Slide Sorter View](#)
A window in Microsoft PowerPoint that displays thumbnail versions of all your slides, arranged in horizontal rows.
- [Speaker Notes](#)

Speaker notes are notes added to the PowerPoint presentation slides for a reference for the presenter of the presentation.

■ [Storyboard](#)

In Windows Movie Maker or other movie making software, the Storyboard is an editing area located at the bottom of the window. It is a panel of pictures or other movie clips, laid out in the sequence that they will be shown in the movie.

■ [Summary Slide](#)

The summary slide feature in Microsoft PowerPoint creates one new slide with a list of all the titles of the slides in the presentation

■ [Task Pane](#)

Different areas of the Microsoft PowerPoint screen are known as panes. The Task pane is located on the right of the screen. It changes to display options associated with the current task.

■ [Thumbnail](#)

A thumbnail is the term used to describe a minute version of a slide or picture.

■ [Timeline](#)

The Timeline view of Windows Movie Maker or other movie making software shows the components of the movie such as photos, video and audio clips in the order and timing that they will appear in movie.

■ [Transition](#)

Slide transitions are the visual movements as one slide changes to another.

■ [USB Flash Drive](#)

USB Flash Drives are compact file storage devices approximately the size of a disposable lighter.

■ [Video Capture](#)

Use Windows Movie Maker to capture your video clips to your computer.

■ [Video Effects](#)

Video effects differ from video transitions as they apply to the individual picture itself rather than to the change from one picture to another.

■ [Video or Movie Frame](#) Definition of video frame.

■ [Video Transition](#)

Video transitions are the visual movements as one picture changes to another.

■ [Watermark](#)

A watermark, in presentation software, is frequently used in a slightly different manner. A watermark is often a faded image or text used as a background of a slide. It is meant to enhance, but not be the focal point of the slide.

SOURCE:

http://presentationsoft.about.com/od/a/Presentation_Software_Terminology_Letter_A.htm

Features of Presentation Software

Presentation Software typically includes three major features: an **editor** that allows text to be inserted and formatted, a method for **inserting and manipulating graphic images** and a **slide-show system** to display the content.

Below are some of the specific features of PowerPoint 2003. **Animation:** This feature allows you to apply visual effects to individual items on the slide such as graphics, titles or bullet points.

Slide Show: helps to display and project all the digital slides created, shown one after the other, or as set in a custom show.

Notes Area: Allows the speaker to keep notes for personal reference during the presentation.

Summary slide: This feature creates one new slide with a list of all the titles of the slides in the presentation

Transition: Allows you to add visual movements as one slide changes to another.

Slide Master: Allows you to preset layouts, colors and fonts for all slides in the presentation at once

Insert text: Allows you to insert text in the presentation.

Delete text: Allows you to erase characters, words, charts, or slides as easily

Cut and Paste: Allows you to remove (cut) a section of text from one place in a presentation and insert (paste) it somewhere else.

Copy: Allows you to duplicate a section of text.

Page layout: Allows you to define various page sizes and margins.

Search and Replace: Allows you to search for a particular word or phrase. And replace it with another everywhere in the presentation

Graphics: The presentation application permits the addition of various types of graphics, such as bar charts, line charts, clip art, and photographs.

Headers, Footers, & Slide Numbering: Allows you to specify customized headers and footers that the presentation file will put at the top and bottom of every presentation. The presentation automatically keeps track of page numbers so that the correct number appears on each page.

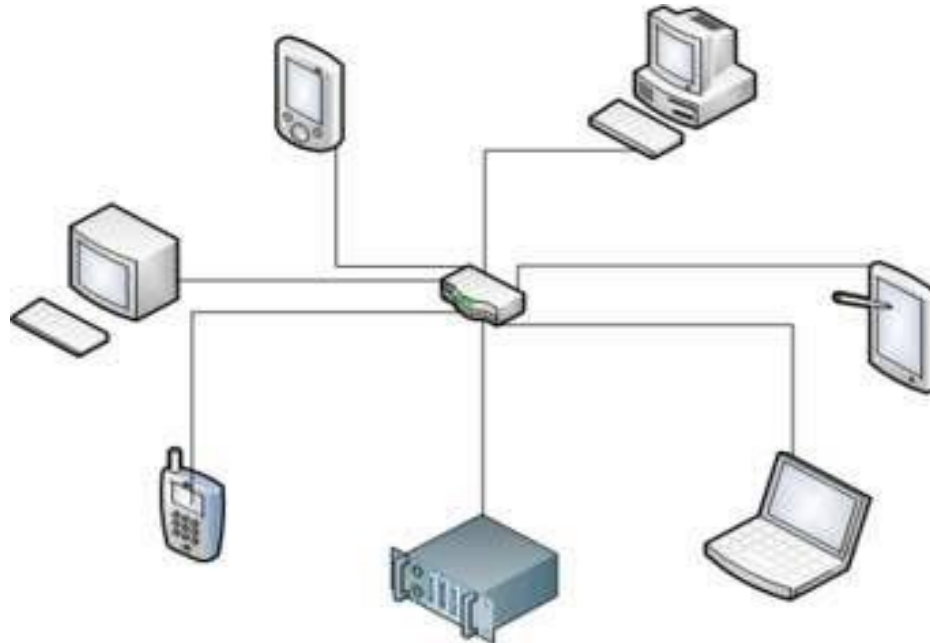
Spell Checker: A utility that allows you to check the spelling of words in a presentation file.

Print: Allows you to send a presentation file to a printer to get a hardcopy or many hardcopies as you would like.

Thesaurus: A built-in thesaurus that allows you to search for synonyms (words with similar meaning) and antonyms ('opposites') without leaving the word processor.

Tables: Allows you to add tables and include content in rows and columns

DATA COMMUNICATION & NETWORKING



Content

1. Introduction to data communication

- a) Introduction
- b) Elements of data communication
- c) Data communication tools
- d) Data transmission media
- e) Data communication services

2. Introduction to computer Networks

- a) Basic requirements for setting up a network
- b) Types of computer networks
- c) Computer network models

Introduction

Data communication is the exchange of data between a source and a receiver. Data communication is said to be local if the communicating devices are in the same building or a similarly restricted geographical area.

Source: this is the device that transmits the data

Receiver: is the device that receives the data transmitted.

Elements of data communication

The Components of a data communication system include;

- i. Message
- ii. Sender
- iii. Receiver
- iv. Medium
- v. Protocol

1. **Message:** This is the information or data to be transmitted. It consists of text, numbers, images, sound or video.
2. **Sender:** This is the device/ computer that generates and send the message.
3. **Receiver:** This is the device or computer that receives the message.
4. **Medium:** This is the channel or physical path through which the message is carried from the sender to the receiver. The medium can be wired like twisted pair, coaxial cable, fibre optic cable or wireless like laser, radio waves & microwaves.
5. **Protocol:** This is the set of rules that govern communication between computers on a network. Both the sender and the receiver follow the same protocol to communicate with each other.

Examples of protocols

1. UDPP (User Data Program protocol)
2. ICMP (Internet Control Message Protocol)
3. SMTP (Simple Mail Transfer Protocol)
4. HTTP (Hyper Text Transfer Protocol)
5. FTP (File Transfer Protocol)
6. TELNET (Terminal Emulation Protocol)
7. SLIP (Serial Line Internet Protocol)
8. PPP (Point to Point Protocol)

FUNCTIONS PERFORMED BY PROTOCOLS

1. Data sequencing
2. Data routing
3. Data formatting
4. Flow control
5. Error control
6. Precedence and order transmission
7. Connection establishment and termination
8. Data security

1. **Data sequencing:** this refers to breaking a long message into smaller packets of fixed size. Data sequencing defines the method of numbering packets to detect loss or duplication of packets and to correctly identify packets which belong to the same message.
2. **Data routing:** defines the most efficient path between the source and the destination.
3. **Data security:** Protocols provide data security and privacy. It prevents access of data by unauthorized users.
4. **Flow control:** Protocol also prevents a fast sender from overwhelming a slow receiver. It ensures resource sharing and protection against traffic congestion by regulating the flow of data on communication lines.
5. **Precedence and order transmission:** Protocols ensure that the nodes get chance to use the communication lines and other resources of the network based on the priorities assigned to them.
6. **Connection establishment and termination:** protocols define how connection are established, maintained and terminated when two nodes of the network want to communicate with each other.
7. **Data formatting:** Data formatting rules define which group of bits or characters within packets constitute data, control, addressing or other information.
8. **Error control:** protocols detect errors in the message so as to ensure transmission of correct messages. The most common method is to transmit erroneous message block. In such a case, a block having error is discarded by the receiver and is retransmitted by the sender.

NB: The main protocol suite governing communication on the internet is the **TCP/IP** (Transmission Control Protocol/ Internet Protocol.)

TCP: Breaks up information into data programs / packets and the reassembles them at the receiving end.

A data program / packet is a unit of data that can be sent in one go over a transmission media.

IP: this is responsible for routing/ directing each data program to its destination. Simple Mail Transfer Protocol (SMTP) - an internet protocol for transferring of emails.

File Transfer Protocol (FTP): It allows files containing text, programs, graphics, numerical data, and so on to be downloaded off or uploaded onto a network.

Internet Protocol (IP) - does the packet forwarding and routing.

Transmission Control Protocol/Internet Protocol (TCP/IP) is a network standard that defines how messages (data) are routed from one end of a network to the other, ensuring the data arrives correctly.

Transmission Control Protocol (TCP) - responsible for delivery of data over the network.

Hypertext Transfer Protocol (HTTP): It allows Web browsers and servers to send and receive Web pages.

Simple Network Management Protocol (SNMP): It allows the management of networked nodes to be managed from a single point.

Telnet Protocol: It provides terminal emulation that allows a personal computer or workstation to act as a terminal, or access device, for a server. **Sequential Packet Exchange (IPX/SPX)** - works with the Novell's internet work' packet / sequential exchange; responsible for delivery of sequential data over the network.

How protocols work?

Network protocols are designed after the open system interconnection model(OSI) A system designed to help designers come up with high quality layered protocols

Data communication tools

Electronic data communication tools

- Computers
- Mobile phones
- Internet

Manual communication tools

- Bells
- Drums
- Messengers

Data transmission media

A Transmission media is a pathway that carries information from the sender to the receiver.

Types of transmission media

1. Wired **or** Guided / bounded transmission media
2. Wireless **or** Unguided or unbound transmission media

Wired or guide transmission media

These are cables that tangible and limited by physical geography used to transmit data and information. Example include

1. Twisted pair cable
2. Coaxial cables
3. Fibre optical cables.

Wireless or unbound transmission media

These transmit data without using any wire. They are not limited by the physical geography. This transmission uses micro waves, radio waves, infrared.

Communication media

A transmission media is a path way used for carrying data from one point to another until it reaches the receiver.

Types of communication media

- i. Physical (cable) /Guided media
- ii. Logical (wireless) Unguided media

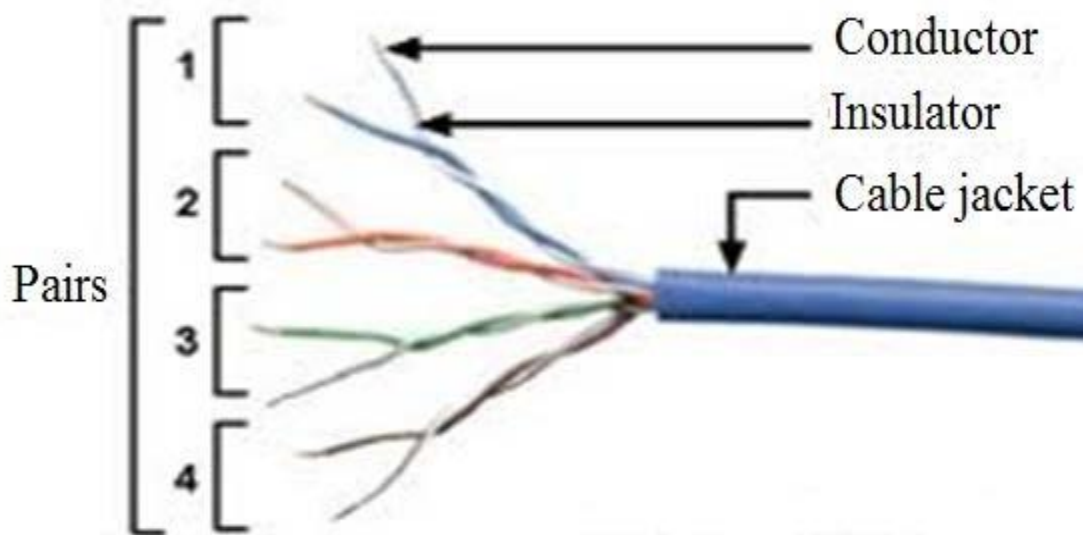
Guided transmission media

This includes all the physical (tangible) media used to transmit data. Examples of guided/physical transmission media

1. Twisted pair cable
2. Coaxial cable
3. Fibre optic cable

Twisted pair cable.

This consists of eight insulated copper wires twisted in pairs & arranged in regular spiral pattern to minimize electromagnetic interference between them.



Types of Twisted pair cables

- (i) Shielded twisted pair (STP)
- (ii) Unshielded twisted pair (UTP)

(i) Shielded twisted pair (STP)

This is a cable that has a metal wrapper around each twisted pair wire to further reduce noise. STP cables are used in environment susceptible to noise, such as local area network.

Unshielded twisted pair (UTP):

This is a cable which does not have a metal wrapper for shielding noise. UTP cables are commonly used in telephone networks and data communication between computers because it is inexpensive and easy to install. **Merits & demerits of twisted pair cable**

Advantages of twisted pair cable

1. Data cannot be easily distorted due to reduced noise interface.
2. Twisted pair wire is inexpensive.
3. Easy to install.
4. Used in transmission of data and voice

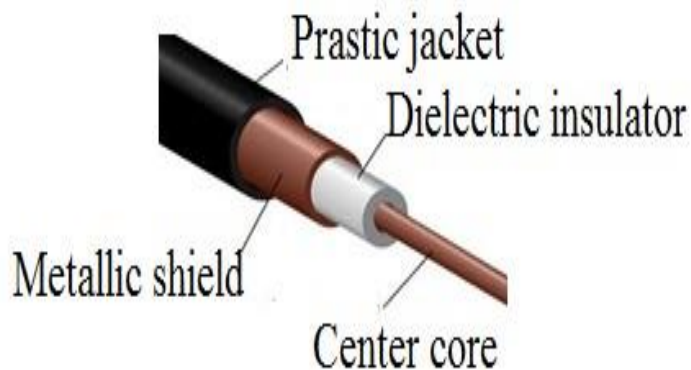
Disadvantages of twisted pair cable

1. Susceptible to noise.
2. Slows data transmission between devices.
3. Limited to short distances.

2. Coaxial cable

A coaxial is a cable that consists of a single copper wire conductor surrounded by three layers of insulation. These layers include;

1. A non- conducting insulating material (outer jacket)
2. A woven or braided metal outer conductor (braided copper shield) 3. Plastic outer coating



Merits and demerits of Coaxial cables

Advantages of coaxial cables

1. Can be cabled over long distances.
2. Less susceptible to electric interference.
3. Can transmit much more data at a time

Disadvantages of coaxial cables

1. More expensive than a twisted pair cable.
2. Not easy to install
3. Need boosters to transmit data.
4. They are bulky

3. Fibre optic cable.

This consists of dozens of hundreds of smooth thin strands of glass or plastic that use light to transmit signals. Each strand called an optical fibre is as thin as human hair. An insulating glass

cladding and a protective coating surround each optic fibre. Fibre optic cables are used by many local and long distance telephone companies, cable TV and in high traffic networks or as the main cable in the network.



Merits & demerits of Fiber optic cable...

Advantages of fibre optic cable

1. Carry more signals than wireless cables.
2. They offer faster data transmission.
3. Less susceptible to noise
4. Better security for signals during transmission
5. Smaller size and much thinner and lighter than wire cables.

Disadvantages of fibre optic cable

1. Cost more than wire cables
2. Difficult to install and modify.
3. More fragile than other wire based communication channels.

2. UNGUIDED TRANSMISSION MEDIA

These are invisible communication media that use waves to transfer data from one point to another.

They are also referred to as wireless transmission media

Examples of wireless transmission media include;

- a) Radio waves
- b) Satellite communication
- c) Infrared (IR)

Radio waves

This is a wireless transmission that distributes signals through air using electromagnetic waves.

Radio waves include:

1. Blue tooth
2. Micro waves

Blue tooth:

This is a short range radio wave communication that can transmit signals among the embedded communication devices within a shorter distance.

Such devices include;

1. Desktop computers,
2. Hand held computers
3. Cellular phones
4. Printers etc.

2. Micro waves:

These are radio waves that provide a high-speed transmission of both voice communications and data signals. Micro waves transmit signals in a straight line so there should be no obstructions such as buildings between microwave antennae. This is why; microwaves stations are often located on tops of buildings, towers or mountains to avoid possible obstructions.

Merits and demerits of microwaves

Advantages of microwaves

1. Provides high-speed communication transmission.
2. No need to install cable.
3. Lower installation and maintenance costs.

Disadvantages of microwaves

1. Limited to line-of-sight transmission
2. May be affected by temporary atmospheric disturbances

b) Satellite communication:

A satellite is a space station that receives microwave signals, amplifies them and then transmits them to other earth based stations. Communication satellites are usually placed about 22,300 miles above the earth's equator and moves at the same rate as the earth

Applications of communication satellite

1. Television.
2. Radio broadcast.
3. Video conferencing.
4. Paging and global positioning systems

Merits & Demerits of satellites

Advantages of Communications satellites

1. Lots of data can be sent simultaneously
2. Allow high quality broadband communication across continents.
3. Covers a large geographical area for data transmission.
4. Provide a high speed of data transmission

Disadvantages of communication satellite

1. The fee to launch a satellite is extremely expensive.
2. The infrastructure needed to access satellite communications is also expensive.
3. It needs a highly trained technical support.

c) Infrared (IR):

This is a wireless transmission media that sends signals using light waves.

Just like microwaves, infrared transmission also requires a line of sight transmission (travel in a straight line).

Just like blue tooth, infrared can also act as alternative short range communication.

Factors which determine the data transmission capabilities of a device

- Band width
 - Radiation
 - Noise absorption
 - Attenuation
- a) **Band width:** This refers to the data carrying capacity of a channel or medium. The higher the band width, the higher the data rate transmitted.
 - b) **Radiation:** This refers to the leakage of signals from the medium due to undesirable electrical characteristics of the medium.
- Factors which determine the data transmission capabilities of a device...
 - **Noise absorption:** refers to the susceptibility of the medium to external electrical noise that can cause distortion of the data signal.
 - **Attenuation:** This refers to the loss of energy as signal propagate outwards. The amount of energy lost depends on frequency. Radiations and physical characteristics of the Medias contribute to attenuation.

TRANSMISSION MODE

Types of direction transmission

1. Simplex transmission
2. Half duplex transmission
3. Full duplex transmission

1) Simplex transmission.

This is where data flow in one direction from the sending device to the receiving device. This type of transmission is used only when the sending device does not require a response from the receiving device.

Examples of simplex transmission include:

1. A radio transmission,
2. A TV transmission,
3. Security systems, Temperature sensors, fire alarms
4. Printing systems, pagers.

2) Half Duplex Transmission.

This is a type of transmission where data can flow in either direction from the sending device to the receiving device and back but not at the same time.

Examples of half duplex transmission include:

1. Fax machines
2. Radio calls
3. Credit card verification systems.
4. Automatic teller machines (ATM)

3) Full Duplex Transmission.

This is a type of transmission where data can flow in both directions at the same time. E.g. a regular telephone line.

Transmission can also be; synchronous or asynchronous.

Asynchronous transmission:

This is a transmission method where data is sent a character at a time. This means that there must be a start bit for each byte and a stop bit. Here data can be sent at any time. Its disadvantage is that it is very slow.

Synchronous transmission:

This is a transmission method where large blocks of bytes are sent at a regular interval without any start or stop bits. Its advantage is that it is very fast.

Data communication services

- E mails
- Skype
- News groups
- Instant massaging

Introduction to computer Networks

A computer network is an interconnection of computers and other network devices to exchange data and share resources. Computers on a network may be linked through cables, telephone lines, radio waves, satellite or infrared beams.

Basic requirements for setting up a network

1. Networking hardware
2. Modems
3. Transmission media
4. Net working software

Networking hardware

These are the tangible and physical devices used in connecting computers and devices together
Examples:

1. Network Interface Card (NIC)
2. Modems & Codec
3. Routers
4. Bridges
5. Gateways
6. A repeater
7. Switches & Hubs

Roles of each networking hardware

- **NIC:** This is a hardware which provides a physical connection between the computer and the transmission media. The most common NICs are the Ethernet card and the wireless adopter.
- **Switches:** this is a device that provides a central connection point for cables from workstations, servers & peripherals.
- **Repeaters:** hardware device which boosts /regenerates or amplifies the strength of the signal as it passes along the cable. Repeaters enable the network to eliminate **attenuation problem**.
- **Routers** these are devices which determine the best route to send the message hence reducing network traffic.
- **Gateway.** This is a hardware which connects two networks of different protocols and architecture.
- **A repeater:** is used to retransmit received signal from one cable segment to other port to re-energize the signal strength over a given distance.
- **A network hub:** is used to connect computers and other peripheral devices to a network.
- **A switch:** is a smart network device that receives data and directly forwards to the correct address node only.

- **A router:** directs or routes network messages across one or more different networks. It determines the best path a message should take to its destination based on the address of the destination.
- **Gateway:** is a device that connects to dissimilar networks such as two networks using different communication protocols.
- **A bridge:** is a network device that connects two networks based on similar technology. Eg lan in one city to another.

Types of computer networks

- a) Local area networks (LAN)
 - b) Wide are network (WAN)
 - c) Metropolitan area network (MAN)
 - d) Wireless local area network (WLAN)
- a) **LAN:** This is a network confined to a relatively small geographical area. E.g. a school, hospital
 - b) **WAN:** this is a network which connects computers in a large geographical area.
 - c) **MAN:** this is a network that is slightly larger than LAN but smaller than WAN.

Implication of installing a computer network

Advantages

1. It allows sharing of hardware like printers.
2. It allows sharing of software between two or more computers, hence reducing on cost.
3. It allows sharing of data and information stored on other computers on the network.
4. Facilitate communications between people e.g. through electronic-mail, Mobile phones, etc.
5. Security. Files and programs on a network can be safe i.e. passwords can be established for specific directories to restrict access to authorized users.
6. It allows flexible access to common databases for example in banks.
7. Provides for online employment e.g. telecommuting.
8. Speed. Networks provide a very rapid method for transferring files.

COMPUTER NETWORK MODELS

- 1) Peer to peer
- 2) Client server model

Network topology

This is the way in which computers & other devices are arranged on the network.
Topology can be viewed into two ways i.e.;

- a) Logical topology
- b) Physical topology

Logical /signal topology deals with the way data moves from one device to the next on the network.

Examples of logical topologies

- 1) Ethernet topology
- 2) Token ring

- In Ethernet topology, all computers listen to the network media and can only send when none of the others is sending.
- In token ring topology, a special package for data called a token goes around the network & only the computer whose address is on the data held in **Physical topology**.

Physical topology

This refers to the physical layout or arrangement of components on the network.

Types of physical topology.

- a) Bus topology
- b) Star topology
- c) Ring topology
- d) Mesh topology

Types of network topologies

- a) Linear /bus topology
- b) Ring
- c) Star
- d) Hybrid
- e) Hierarchical /tree

1. **Bus topology:**

This is a network topology where all devices are connected to single linear cable called a **bus** or the backbone. Data in a bus can be transmitted in both directions. As data passes along the cable, each station checks whether the data is addressed to it. If the data is addressed to it, it receives it otherwise, it rejects it. In a bus topology, a **terminator** is attached at each end of the cable to avoid signal bouncing.

Advantages of a bus topology

1. Easy to connect a computer or peripherals
2. Requires less cable length than a star topology
3. Inexpensive and easy to install.
4. Computers and devices can be attached and detached at any point on the bus without disturbing the rest of the network.

5. Failure one device usually does not affect the rest of the bus network

Disadvantages of a bus topology

1. If the main cable (back bone) breaks down, the entire network is cut off.
2. It requires terminators to stop signal bouncing.
3. It is difficult to identify the problem when the entire network is shut down.
4. This form of network cannot stand as a stand alone solution in a large building.
5. If many computers are attached, the amount of data flowing along the cable increases, data collision occur and the network slows down

2. Ring topology

This is where all the nodes and devices on a network are connected to one another on a single cable forming a closed loop.

In a ring, data travels in one direction along the entire ring and each device is responsible for regenerating & retransmitting the data (token) to its neighbor.

Advantages of a ring topology

1. There is less data collision thus the speed of transmission is fast.
2. There is less signal degeneration because each work station is responsible for retransmitting the weak signals.
3. Ring topology can span long distances than bus
4. It is easier to detect a device that has caused the network failure.
5. It is very simple to install
6. Less cable length is required

Disadvantages of a ring topology

1. If the cable fails, the whole network goes down.
2. More difficult to install and troubleshoot the ring.
3. If one node is fails, the whole network is affected.
4. Because all stations are wired together, to add a station, you must shut down the network temporarily.

3. Star topology

This is a topology where all computers and the devices are connected to a central hub/switch thus forming a star. When a hub receives data from a transmitting computer, it broadcasts the message to the receiving node.

Advantages of a Star topology

1. Easy to install and maintain.

2. There is no network disruption if devices are added or removed from the network.
3. It is reliable because each device connects directly to the hub. If one device fails, only that device is affected
4. Has a Good performance. Data packets are sent quickly as they do not have to travel through any unnecessary nodes.
5. It is easy to detect and replace faults.

Disadvantages of a Star topology

1. If a hub fails, the entire network is will be down.
2. It is expensive to install because it requires a lot of cables.
3. It takes a lot of time to install.

4. Hybrid topology

This is a topology that combines two or more topologies together to form one network. E.g. star, ring and bus. Hybrid topology includes the following;

1. Extended star topology
2. Hierarchical Topology
3. Mesh topology

Extended star/ tree topology:

A tree topology combines characteristics of linear bus and star topologies.

It consists of groups of star-configured workstations connected to a linear bus backbone cable. Tree topologies allow for the expansion of an existing network, and enable schools to configure a network to meet their needs.

Disadvantages of a Tree Topology

1. Overall length of each segment is limited by the type of cabling used.
2. If the backbone line breaks, the entire segment goes down.
3. More difficult to configure and wire than other topologies.

Mesh topology

Considerations when choosing a topology

- » Expense
- » Length of cable needed
- » Future growth
- » Type of cables

- 1. Expense:** the cheapest topology is the linear bus topology and the most expensive topology is the hybrid topology.
- 2. Length of cable needed:** the linear bus topology uses less cables compared to the rest of the topologies.

- 3. Future growth:** if the network is to be extended in the near future, then the star topology is better because it is easy to attach devices
- 4. Type of cables:** the cheapest cable and most commonly used cable in schools is the unshielded twisted pair. The most expensive cable is fiber optics.

Questions

- Describe services provided by data communication tools.
- What is a computer network?
- What are the implications of computer networks?
- Identify the different types of computer networks

SYSTEM SECURITY, ICT ETHICAL ISSUES & EMERGING TECHNOLOGIES



Content

1. Computer system security

- Introduction
- Computer security
- Internet and network attacks
- Data protection in a computer system
- Computer crimes

2. Privacy and ICT ethical issues

- ICT ethics & society
- Intellectual property
- Information privacy

3. Emerging technologies

- Introduction

- b) Application areas of specific emerging technologies
- c) Implications of emerging technologies

4. ICT industry

- a) Careers in ICT industry
- b) ICT in SMEs

COMPUTER SYSTEM SECURITY

This the process of Physical security measures refers to the measures taken to protect systems, buildings and related supporting infrastructures against damage from accidents, fire and environmental hazards.

Terminologies

- 1 **A Fire Wall:** This refers to both Hardware and software used to restrict access to data and information on a network.
- 2 **Expert system:** This is a computer application that performs a task that would be performed by human experts. E.g. patient diagnosis
- 3 **Virtual reality:** this an artificial environment

Introduction

Computer security /cyber security or IT security, is the protection of information systems from theft or damage to the hardware, the software, and to the information on them, as well as from disruption or misdirection of the services they provide.

System security refers to Access controls, which prevent unauthorized personnel from entering or accessing a system.

Computer Security is the process of preventing and detecting unauthorized use of your computer. It involves the process of safeguarding against intruders from using your computer resources for malicious intents or for their own gains.

Computer Security refers to the measures taken to safeguard against damage to the computer hardware, software and data.

A computer security risk is any action that causes a loss or a damage to computer hardware, software or data.

Forms of computer security include;

1. Data security
2. Physical security

Computer security risks in the laboratory.

1. Absence of Fire extinguisher poses a fire risk.
2. Absence of a lightening conductor on a computer laboratory causes a risk to lightening
3. Absence of burglar proofs and strong locks poses a risk of hardware theft
4. Absence of strong passwords and firewalls poses a risk of data theft

5. Absence of updated antivirus software on a computer posed a risk to data loss by viruses.

Ways to enforce computer laboratory security.

1. Configure settings with strong firewall and access passwords
2. Establish burglar proofs and strong locks to keep the computers secure from thieves
3. Ensure regularly updated antivirus software is protecting the computers against virus attacks
4. Install lightening conductor to the computer lab to safeguard against lightening.
5. Purchase fire extinguishers to help fight against fire outbreaks.

State examples of data threats and the way of curbing them

- Non technology based threats:
 - Un authorized disclosure due to files left on the desk.
 - Computer monitors viewable by outsider
 - Natural disasters
 - Phishing incidences
 - Stolen laptops
- technology based threats
 - Virus attack
 - Internet and network attacks

An **attack** is any attempt to destroy, expose, alter, disable, steal or gain unauthorized access to or make unauthorized use of an asset.

Examples of internet attacks

- Denial of service attack e.g. ping flood, smurfing, fragile,

Data protection in a computer system

1. Save your work as you work
2. Make data and file back ups
3. Keep a copy of your data offsite
4. Protect your passwords from any person.
5. Perform regular computer maintenance and servicing

Computer crimes

A **computer** crime is any bad behaviour / act done using a computer. An illegal act or behaviour done on a computer connected on a network is known as a **cybercrime**. They are criminal activities which involve the use of information technology to gain an illegal access to a computer system with the aim of damaging, deleting or altering computer data.

Examples of common computer crimes

- i. Hacking

- ii. Piracy
- iii. Phishing
- iv. Trespassing
- v. Writing malicious codes
- vi. Cyber bullying
- vii. Cyber stalking
- viii. Cyber terrorism
- ix. Identity theft
- x. Spamming
- xi. Plagiarism
- xii. Espionage
- xiii. Forgery
- xiv. Uploading pornographic
- xv. Wiretapping videos and pictures

Examples of computer crimes

1. **Hacking:** This is the act of breaking into the computer to gain unauthorized access to information.
2. **Phishing:** This is the act of attempting to acquire sensitive information like user names, passwords and credit card details by distinguishing as a trustworthy source.
3. **Computer viruses:** These are computer programs that replicate themselves and harm the computer systems on the network without the knowledge of system users.
4. **Taping/ eavesdropping:** this is the act of taping one's line with an intention of accessing private information without the owner's knowledge.
5. **Cyber stalking:** is the use of communication technology to stalk a person online. The stalker sends threatening emails, spreads false information and accusations, transmit threats on the internet and damages data and equipment.
6. **Sniffing;** it is a type of eavesdropping program that monitors information travelling over a network it allows hackers to steal information from anywhere on the network including e mail messages, company files and confidential reports.
7. **Spoofing;** here hackers try to hide their true identity or misrepresent themselves by using fake email address masquerading as someone else.
8. **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 one's own. E.g. use of somebody else's credit card or business card.

PRIVACY AND ICT ETHICAL ISSUES

Privacy: This is the right of people not reveal information about themselves.

Ethics is defined as “a set conduct of moral values or principals that govern the conduct of an individual or a group. Therefore,

Computer ethics is set of moral principles that regulate the use of computers. It can also be defined as the moral guidelines of computer users while buying, utilizing & disposing off computer or their parts.

ICT ethics & society

ICT ethics is set of moral principles that regulate the use of ICT tools in the society.

Ethics that should be put in mind when using computers

- i. Sending warnings to colleagues in case of a virus attack
- ii. Asking permission from people before sending them messages
- iii. Using authorized software
- iv. Proper identification when using social networks
- v. Respect to Environment by proper disposal of hardware
- vi. Respect of humanity and Dignity
- vii. Use of descent ICT games

Unethical practices done by users

1. Failure to alert friends in case of a virus attack
2. Sending unsolicited messages
3. Using other people’s ICT resources without permission
4. Plagiarism
5. Using ICT to bare false witness
6. Copying and using propriety software without pay
7. Hacking, Phishing and Pharming

INTELLECTUAL PROPERTY

Intellectual property (IP) refers to the work created by inventors, authors and artists.

Intellectual Property Rights are the rights to which creators are entitled for their work.

Examples of the intellectual property rights

- 1) Copy right ©
- 2) Trade mark ®

A copy right gives authors & artists exclusive rights to duplicate, publish & sell their material

A trade mark protects the company’s logo & names.

Factors limiting enforcement of violation of copyright & intellectual property

1. Inadequate skilled manpower
2. Insufficient funds to employ law enforcers
3. Unregistered authors
4. Ignorance among the customers and authors about the laws.

Code of conduct

- This is a written guideline that helps to determine whether is ethical or unethical.
- It is a voluntary set of rules which people agree to follow or abide by.

GREEN COMPUTING

This is the use of computers in an environmentally friendly way in a way that has no negative effects on the environment.

Goals of green computing

1. To reduce the use of dangerous materials
2. To maximize energy efficiency during the product's life time.
3. To promote the recyclability/ biodegradability of outdated products & factory waste.

EMERGING TECHNOLOGIES

These are new technologies which have come about as a result of using ICT.

1. Artificial intelligence
2. Digital forensics
3. Artificial reality

Artificial reality is the artificial or simulated reality that is generated in 3D by computers. It is commonly known as VR, artificial reality or virtual environment.

Artificial intelligence; This is a branch of science concerned with making computers behave like human beings or,

It is the ability of a computer to assume human capabilities such as thinking and self correction.

Examples of artificial intelligence

- | | |
|---------------------|--------------------|
| a) Game playing | d) Expert systems |
| b) Natural language | e) Neural networks |
| c) Robotics | |

Application of artificial intelligence

- Game playing
- Aviation

- Understanding
- natural languages
- Computer vision
- Image processing
- Expert system
- Virtual reality
- Hospital and medicine
- Handwriting recognition
- Telecommunication
- Speech recognition

Digital forensics

This is a branch of investigative science concerned with the recovery of material found in digital devices often in relation to computer crime.

It can also be defined as a process that reveals and interprets electronic data to use in the courts of law Depending on the type of device under investigation,

Digital forensics is divided into sub-Branches which include;

- a) Computer forensics
- b) Mobile devices forensics
- c) Network forensics
- d) Data base forensics

Branches of digital forensics

1. **Computer forensics:** explains the current state of digital objects such as computer system, storage medium etc
2. **Mobile devices forensics:** recovers digital evidences or data from a mobile device.
3. **Network forensics:** monitors & analyses computer network traffic for the purpose of information gathering & crime detection
4. **Data base forensics:** investigates Database & their metadata to recover lost content.

LIMITATIONS OF DIGITAL FORENSICS

- Duplication of data can change data in its form a failure to provide evidence needed in courts of law.
- Time limes are critical for showing who did what and when.

- Digital Forensics requires accurate standards to stand up to cross

ICT INDUSTRY

An occupation or profession, especially one requiring special training, followed as one's lifework

Careers in ICT industry

- Computer programmer
- Information system analyst
- Database programmers and analysts
- Digital home integration
- Mobile application developers
- Computer scientists
- Data communication analysts
- Application support specialists
- Tech help desk technicians
- Network and system security specialists
- Network managers and administrators
- Software engineers
- Technical trainers
- Telecom managers
- Website developers
- Sales engineers
- Technical sales specialists
- Technical writers
- Telecommunication line installers
- Wireless network technicians

ROLES PERFORMED BY ICT PROFESSIONALS

Database administrator.

1. Designing and developing database applications for the organization
2. Setting up security measures needed to control access to data and information
3. Keeping the database up to date by adding new records, modifying or deleting unnecessary records

Computer programmers

- Large organizations such as insurance companies, banks, manufacturing firms and government agencies hire programmers to work together with system analyst in order to;
 - Write in house application programs or systems programs
 - Customize commercial applications to suite the organization needs
 - Test, debug, install and maintain programs developed or customized
 - ICT in SMEs
 - ICT based economic Activities which can be done to earn a living.
1. Writing CDs
 2. Music mixing
 3. Teaching of ICT
 4. Computer dealer / vender

5. Advert designing
6. Software developing
7. Digital money transfer dealing.

A. WEBMASTER

Webmaster develops and maintains web sites and web resources. The job may include back up of company web site, updating resources, or developing of new resources. Webmasters are involved in the design and development of website. Part of their job may also include

Monitoring and updating the interference design. Some webmasters may also work with marketing personnel to increase the site traffic and may be involved in development of web promotions.

B. COMPUTER TRAINERS

Computer trainers instruct new user on the latest software or hardware. They are usually expected to prepare new materials for instructions and may asked to write and maintain course manual. A position may also include des sign and development of the website for the course. Computer trainers typically train new users how to use the latest software and hardware. Experience with the most business software is the advantage.

C. DESKTOP PUBLISHER

Desktop publishers use computers to format and create publication-ready material. They may create books' Magazines' newsletters, and newspapers on computers using special applications software's large part of the job is designing page layout, importing text, and manipulating graphics. Most desktop publisher publishers work for companies that handle commercial printing ad accounts.

D. COMPUTER SUPPORT SPECIALIST

Computer support specialists provide technical support to customers and other Users. They may also be called technical support specialist or help desk technicians. They manage the everyday problems faced by computer users. They resolve common networking problems and may use trouble shooting programs to diagnose problems.

E. COMPUTER TECHNICIAN

Computer technicians may install and repair computer components and systems. The y may work on every thing from personal computers to mainframe servers or printers. Some computer technicians are responsible for setting up and maintaining computer networks. Experience computer technicians may work with computer engineers to diagnose problems and run routine maintenance on complex systems.

Certification-CompTIA's A+ hardware examination and network+

F. DATA ENTRY

Data entry workers input customer information, lists, and other types of data. Input devices are typically limited to keyboards, mice, and Scanners. Because the accuracy of record data is so important, data entry workers are often required to verify the accuracy of data they and others have entered.

G. TECHNICAL WRITERS

Technical writers prepare instructional manuals, technical document reports, and other scientific or technical documents. Most Technical writers work for software firms, government agencies, and research institutions,

H. SOFTWARE ENGINEERS

Most software engineers analyze user need and create application software. Software engineers usually have experience in programming, but focus on the design and development of programs using the principles of mathematics and engineering. They rarely write codes themselves.

I. NETWORK ADMINISTRATOR

Network administrator manages a company's LAN and WAN networks. They may be responsible for the design, implementation and maintenance of networks. Responsibilities usually include the maintenance of both the hard ware and software relating to company's intranet and internet networks. Some are responsible for planning and implementing the security measures as well

Certification –Microsoft certified systems Engineer (MCSE), Certified Novell Administrator (CAN), and Certified Novell Engineer (CNE)

J. CRYPTOGRAPHER

Cryptographer is the science of disguising and revealing encrypted information. In ICT Cryptographer means keeping any intercepted information private. For example, information like financial data, banking and credit card information used on-line shopping or private e-mail and correspondence. Cryptographers design systems, break systems and do research on encryption.

K. INFORMATION SYSTEM MANAGER

Information system manager oversee the work of programmers, computer specialists, system analysts, and other computer professionals. They create and implement corporate computer policy systems. These professionals consult with management, Staff and customers to achieve goals.

L. DATABASE ADMINISTRATORS

Database administrators use database management software to determine the most efficient ways to organize and access a company's data. They are responsible for maintaining database security and backing up systems.

Certifications-MySQL Server, Oracle, and Sybase

M. SYSTEMS ANALYST

A system analyst follows the steps described in the systems development life cycle.

Analyst plan and design new systems or reorganize a company's computer resources to best utilize them.

N. COMPUTER PROGRAMMERS

Computer programmers create, test, and troubleshoot programs used by computers. Programmers may also update and repair existing programmers' certificates- java++, Visual Basic and knowledge of SQL