

Computer studies

Form one work

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Chapter 1

Introduction of computers

Definition of a computer

- A computer is an electronic device that accepts user input (data) and transmits it under influence of sets of special instructions (Program) to produce desired output (Information).

Data

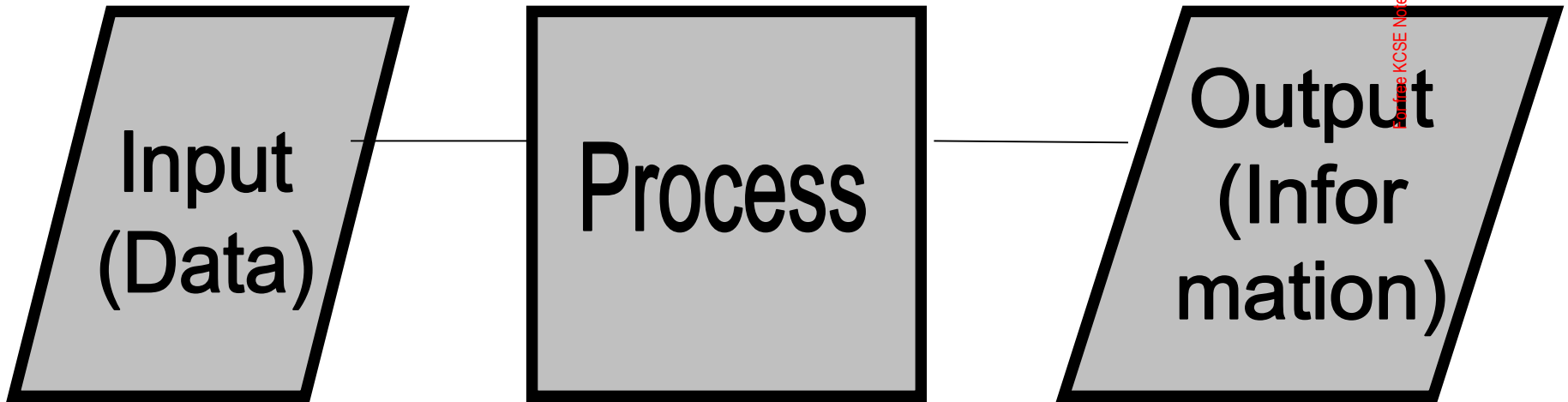
- They are new facts that are meaningless to the user and cannot be used to make decision e.g. numbers, letters etc.

Processing

- Refers to the way data is manipulated to turn into information e.g. arithmetic operation, addition subtraction etc.

Information

- Refers to data which has been processed.



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Typical desktop personal computer



- Computers come in different sizes designs but the most common is a computer referred to as a Personal Computer (PC). Personal computers are mostly used in offices, schools, business premises and at home.

Parts of a computer

Tower type system unit



Desktop type system unit



- System unit – this part houses the heart of the computer and other devices called drives that store, record and read data.
- Peripheral devices – they are connected to system unit using cables called data interface cables that carry data and information to and from the devices.

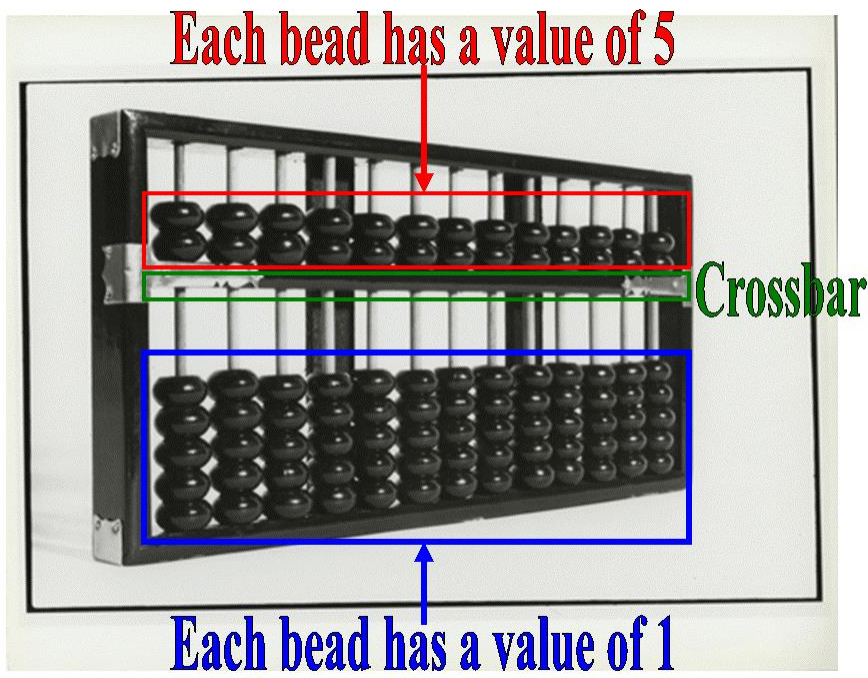
Some of peripheral devices are

- Keyboard – enables the user to enter data and instructions in the computer by pressing keys.
- Mouse – enables user to issue instructions to computer by controlling the mouse pointer displayed on screen.
- Monitor – enables the user to see information (output).

Development of computers

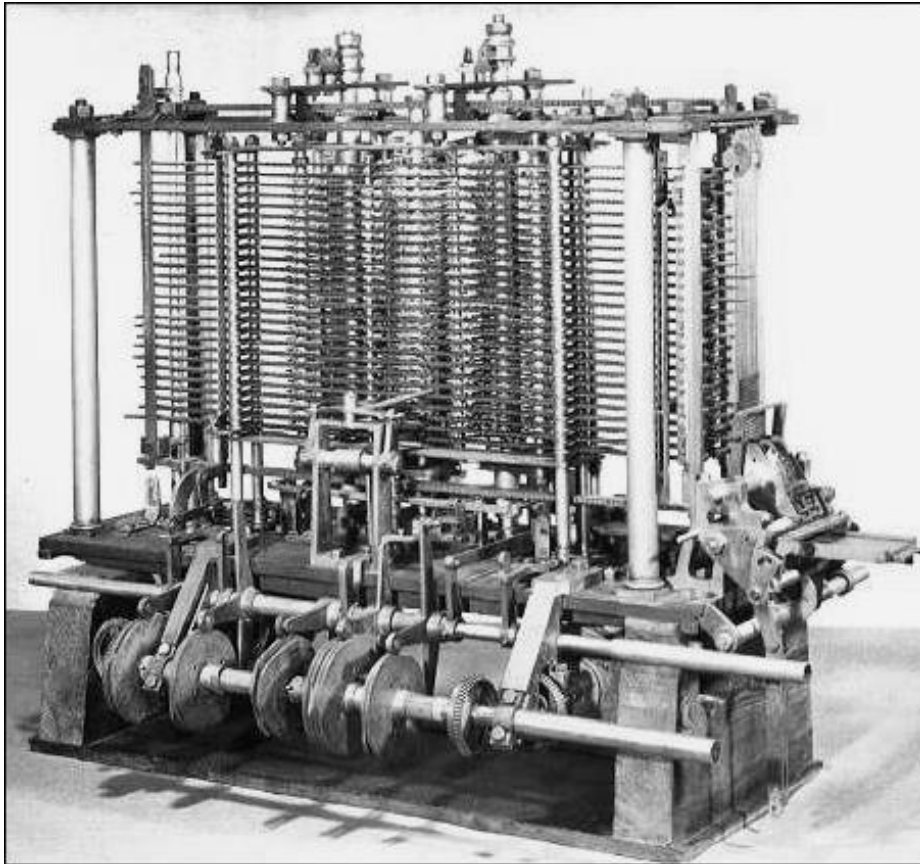
- Historical development of computers can be traced back to the time human beings were struggling to invent non electronic tools that would simplify arithmetic such as Abacus and Napier's bones.

Abacus



- An Abacus was a Chinese counting instrument which dates back to 3000 BC. The Abacus has bead-like parts that move along rods. Each bead above the middle bar stands for five units. Each bead below stands for one unit.

Analytical engine



- The Analytical engine was designed by English mathematician, Charles Babbage in 1832. The engine is recognised as the first real computer and Babbage as the father of computing. The left picture depicts how the analytical engine would have looked like if it was constructed.

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1st generation computer (1940-1958)

Vacuum tube



- These computers were huge, expensive and often broke down. They were slow compared to today's computers, their internal storage capacity was limited. Cards were used to enter data into the computer. They used vacuum tubes to control internal operations. They were used for payroll processing and billing e.g. IBM 650 and UNIVAC.

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Advantages and disadvantages of 1st generation

Advantages

- Vacuum tubes technology made possible the advent of electronic digital computer.
- These computers were the fastest calculating device at their time.

Disadvantages

- They were too bulky.
- They were unreliable.
- Had limited memory.
- They generated a lot of heat.
- Consumed a lot of power.

2nd generation computer (1958-1964)

- They used transistors for internal operations and magnetic card as a primary storage medium. They had increased storage capacity compared to first generation. They had great reduction in size and heat generation, increased speed and reliability compared to first generation e.g. IBM 1401, Honey Wall 200, CDC 1604 etc.

Advantages and disadvantages of 2nd generation

Advantages

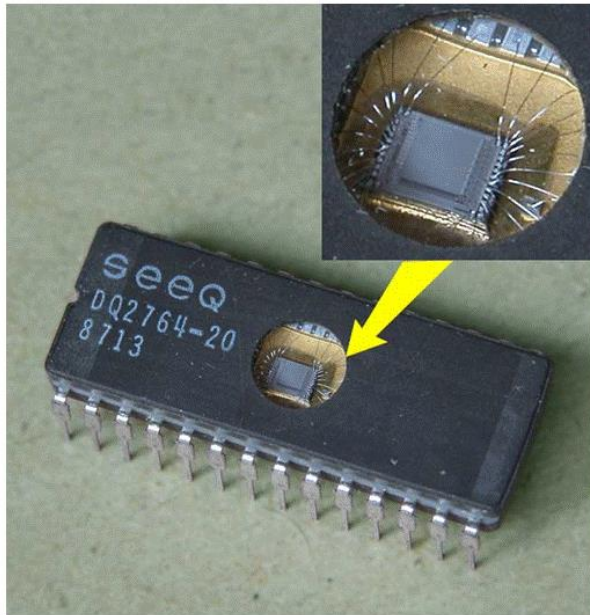
- They were smaller in size compared to first generation.
- They more reliable.
- They generated less heat.
- They were less prone to hardware failure.

Disadvantages

- Require air conditioning to cool them down.
- Required frequent maintenance.
- Commercial production was difficult and costly.

3rd generation computers (1964-1970)

Integrated circuit on silicon chip



- These computers used integrated circuits, increased storage capacity more flexibility with input/output smaller size and better performance of microcomputers. It also introduced software industry operating systems e.g. IBM System 360, Burroughs B5500 etc.

Advantages and disadvantages of 3rd generation

Advantages

- Smaller in size.
- More reliable.
- Emitted less heat.
- Maintenance cost was low because hardware failure were rare.
- Required less power.

Disadvantages

- Highly sophisticated technology required for the manufacture of integrated circuit.
- They were costly

4th generation computers (1970-1989)

Very large scale integrated circuit



- These computers use large scale integrated circuit (LSIC). They have large storage capacity and work at a high speed. Introduction of microprocessor, microcomputers and supercomputers were realized e.g. IBM 3033, Burroughs B7700.

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Advantages and disadvantages of 4th generation

Advantages

- They are smaller in size because of high component density.
- Very reliable.
- Generate negligible heat.
- Much faster in computational.
- They are not prone to hardware failure.
- They are portable because of their small size.

Disadvantage

- Highly sophisticated technology required for manufacturer of LSI chips.

5th generation computers (1990-present)

- This generation is characterised by the emerging of telecommunication with computer technology. Scientists are working on this generation to bring machines with genuine I.Q. the ability to reason logically and with real knowledge of the world. The anticipated computer will have the following characteristics.
 - It is expected to do parallel processing.
 - It will be based on logical inference operations.
 - It's expected to make use artificial intelligence.

Classification of computers

■ Physical size

- Super computers
- Mainframe
- Mini computers
- Micro computers

■ Functionality

- Analog computers
- Digital computers
- Hybrid computers

■ Purpose

- General purpose
- Special purpose
- Dedicated

Super computers (Physical size)



- They are the fastest, largest, most expensive and powerful computers. Mainly used in scientific research, simulation, weapon, analysis etc.

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Mainframe (Physical size)



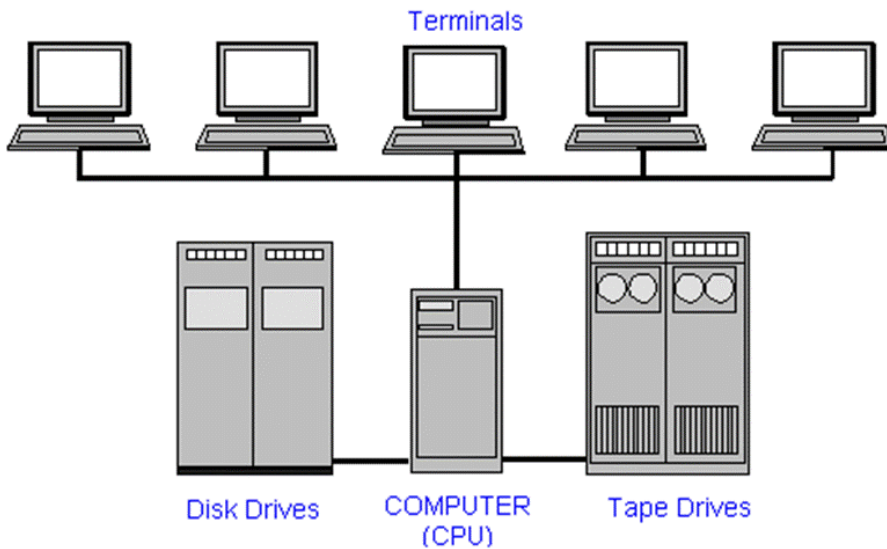
- They are less powerful and less expensive than the super computers. It finds its application in government agencies, big companies e.g. bank, hospital etc.

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Mini computers (Physical size)

Minicomputer system

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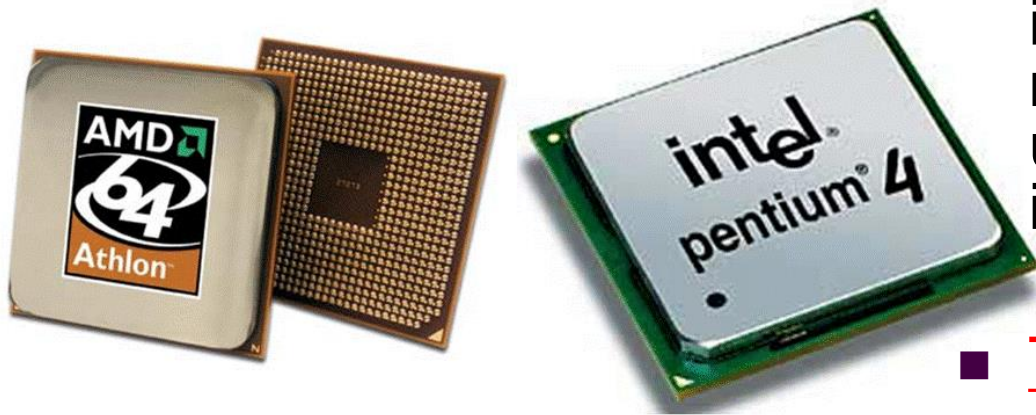


- They are physically smaller and cheaper than mainframes. They are used in research institutions, scientific laboratories etc.

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Micro computers (Physical size)

Microprocessors



- The smallest, cheapest and least powerful type of computers. It's called a microcomputer because its CPU is called a microprocessor. They are used mainly in learning institutions.

- Types of micro computers

- Desktop
- Laptop
- Palm top

Types of micro computer

(Desktop computer)

- Desktop computer – this is not portable. It's designed to be placed on top of an office desk.



Types of micro computer

(Laptop computer)



- Laptop computer – this is portable briefcase. Designed to be used by placing it on the lap.

Types of micro computer

(Palm top computer)



- This is small enough to fit in the pocket and can be held in the palm when being used.

Advantages and disadvantages of laptops

Advantages

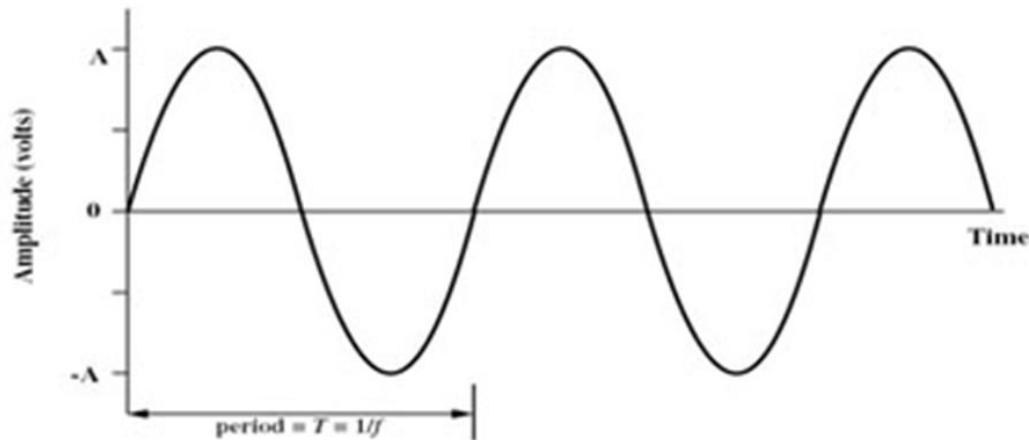
- They are portable.
- Ruggedness – laptop computers are designed to withstand most of the rigors of travel.
- Display – active color screen show sharper, clearer images which prevent eye strain.
- Power – laptop batteries serve as built in uninterruptible power supply.

Disadvantages

- Performance – many laptops have slower clocks speed to conserve power and also have similar memory capacity.
- Expandibility – laptops PCs limit your expansion options.
- Connecting laptops have few ports and no growth potential.
- Security – laptops PCs are easier to steal.
- Display – laptops screens are limited to VGA resolution.

Analog computers (Functionality)

Analog signal

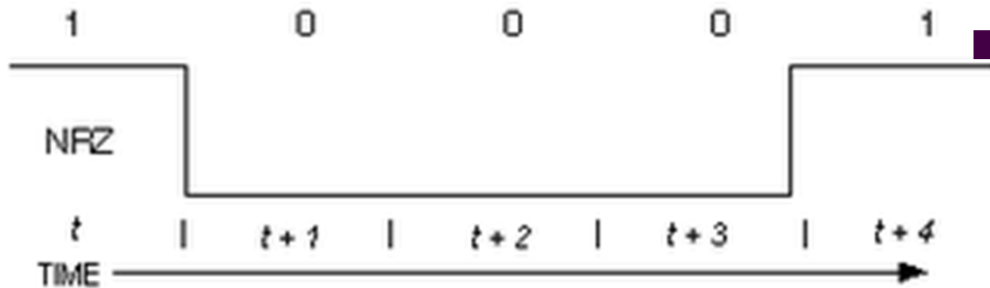


Analog computers – they perform arithmetic operations and logical comparisons by measuring changes in physical magnitude e.g. speed, temperature etc.

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Digital and hybrid computers (Functionality)

Digital signal



- Digital computers – their operations are based on two states namely “on” and “off” or “1” and “0”.

- Hybrid computers – they are computers which are built with the characteristics of both analog and digital computers.

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Purpose

- General purpose – they are designed to be able to perform a variety of tasks.
- Special purpose – they are designed to serve a specific purpose e.g. robots used in industries, mobile phone for communication only etc.
- Dedicated – they are general purpose computers that are committed to some processing task e.g. dedicated to word processor tasks only.

Computer laboratory

- A computer laboratory is a room that has been specially prepared to facilitate installation of computers and to provide a safe conducive environment for teaching and learning of computer studies.

Safety precautions in computer laboratory

- The computer lab, just like any other laboratory, should be setup with safety precautions in mind. Safety precautions and practices can be divided into measures that are meant to protect computer and those that are meant to protect the users.

Behaviour in the computer laboratory

- Avoid smoking or exposing computers to dust. Smoke and dust particles can damage computer components.
- Avoid carrying food and beverage to computer room. Food particles may damage computer components while liquids may cause rusting and electrical shocks.
- Avoid unnecessary movements because you may accidentally knock down peripherals devices.
- Follow the correct procedure for starting and shutting down the computer.
- Accidents which may occur should be reported immediately.
- If you are not sure of how to handle or operate any piece of equipment in the laboratory please ask for assistance.

Ventilation

- There must be good air circulation in the computer room to avoid suffocation and overheating. Proper ventilation enables the computer to cool hence avoid damage to electronic part.

Lighting

- Computer room should be well light to avoid eyestrain that leads to headaches, stress and fatigue. The user may adjust the brightness of the computer monitor until the eyes feel comfortable. Also radiation filter screens may be fitted.

Protection against fire

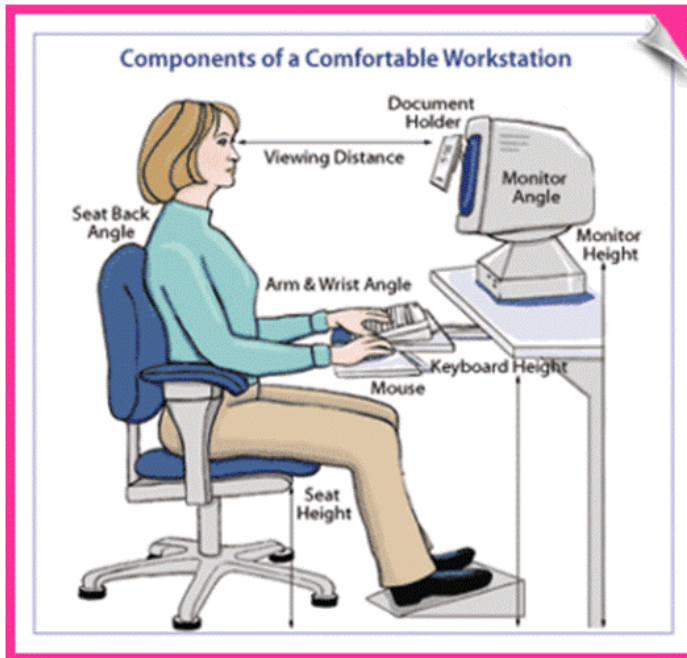
- Computer room should have gaseous fire extinguisher like those filled with CO₂. Water based or powder extinguishers should be avoided because they can damage computer components.

Dust and damp control

- The room should be fitted with special curtains to reduce entry of dust particles. Computers also should remain covered with dust covers when not in use. Humidity should be regulated in the computer room to remain an optimum of 50%. Humidity lower than this allows static electricity to build up and cause damage to computer components. High humidity of over 70% may cause rusting of metallic parts.

Furniture

Sitting posture



- The table on which a computer is placed must be strong and wide enough to hold the weight and accommodate all peripheral devices. The user's seat must be comfortable and have a straight back rest that allows someone to sit upright to avoid muscle pains and aches.

Burglar proofing

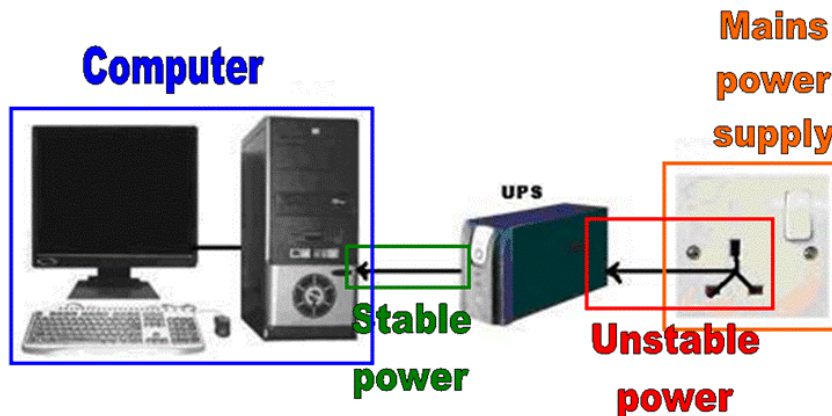
- To prevent unauthorized access to the computer room the following control should be implemented.
 - Fit strong metallic grills and locks on doors, windows.
 - Do not welcome strangers to computer room.
 - Install security alarms at strategic access points to alert security personal incase of break in.

Stable power supply

- Computers require a stable source of power. Power from main supply is not always stable and may damage computer components. To protect the computer from damage due to power instabilities, avoid connecting it directly to mains supply. Instead connect it to a special device called Uninterruptible Power Supply (UPS) then connect the UPS to main supply.

Function of UPS

A computer connected to a UPS



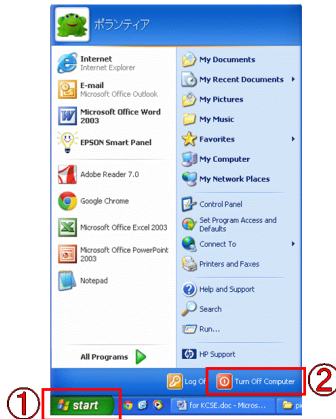
- It regulates power from an unstable power source to the required clean stable voltage.

- It temporarily provides power to computer in case of a sudden power failure.

Starting up (Booting)

- It's the process by which a computer loads system files into the main memory.
- Types of booting
 - Cold booting – the process of switching on a computer that has been off completely by pressing the power button.
 - Warm booting – this happens when the computer, originally on, is forced to restart by pressing the restart button on the system unit.

Shutting down a computer



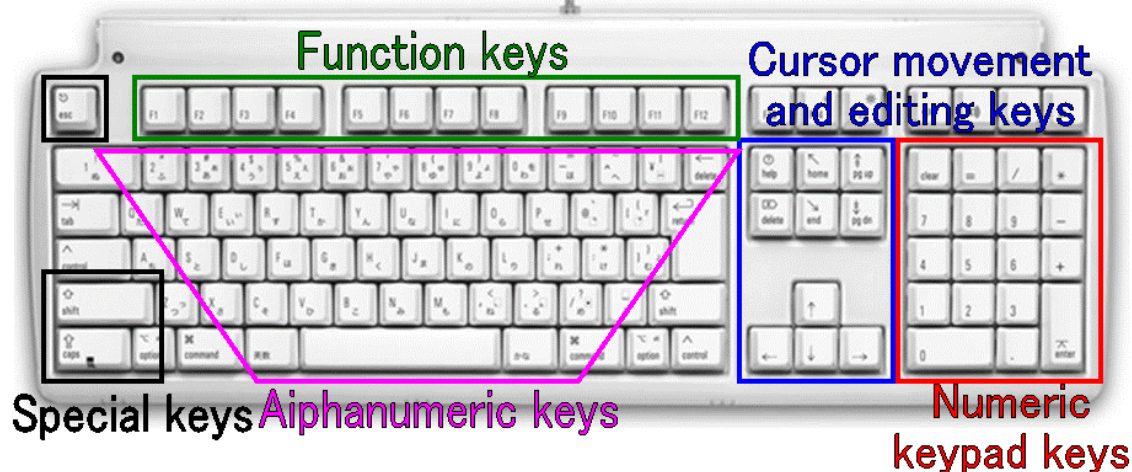
- It is important that the user follows that the correct procedure of shutting down a computer at all time. If the procedure is not followed, then loss of data, damage of programs and computer components may occur

1. On the “Start” menu
2. Click “Shut Down” or “Turn Off Computer”. (Shut down dialog box is displayed)
3. Select “Shut Down” or “Turn Off”.

Parts of keyboard

- **Functions keys – F1 to F12.**
- Alphanumeric (Typing) keys – labelled A – Z, Caps lock, Enter keys, Tab key, Spacebar, backspace etc.
- **Cursor movement (Navigation) & Editing keys – arrow keys, Page up and Page down, Home and end keys, Edit keys, Insert key, Delete**
- Special keys – Shift, Ctrl, Alt, Esc etc.
- **Numeric keys – 0 to 9, +, “, /, -**

QWERTY keyboard layout



Using typing tutor

- In order to increase your typing speed and accuracy, typing software offers the lessons you need to start from using one hand while typing to becoming a proficient user.

Fingers resting on home keys



Mouse techniques

- Clicking – means pressing and releasing the left mouse button once.
- Double clicking – pressing the left button twice in quick succession.
- Right clicking – pressing the right hand side mouse button once.
- Drag and drop – the user drags an item from one location on the screen to another.
- Drag – press and hold down left button and then move the mouse to the new location
- Drop – release the button immediately after dragging the item to the new location.

Review questions 1

1. Define the term computer?
2. State different physical parts that make up a computer.
3. Differentiate the following types of computers:
 - A) Supercomputer and mainframe;
 - B) Minicomputer and a PC.
4. Differentiate between a digital and on analog computer.
5. Give two reasons why smaller computers like laptops tend to be more expensive than desktop computers.
6. Which one of the following is not true about the system unit?
 - A) It houses the CPU.
 - B) It houses the monitor.
 - C) It connects to all peripheral devices using ports.
 - D) It has the computers power switch.

Answer of review questions 1

1. A computer is an electronic device that accepts user input, also referred to as **data**, and transforms it under the influence of sets of special instructions called **programs**, to produce the desired output referred to as **information**.
2. **Monitor, system unit, mouse, keyboard, etc.**
3. A). A supercomputer is larger and has more processing power and memory than a mainframe.
B). **A minicomputer is larger in physical size and more powerful than a PC. PC was designed to be used by one person only.**
4. A digital computer processes discrete data while an analog computer processes continuous data.
5. **A). The technology of producing smaller devices is expensive.**
B). Convenience because of their portability.
6. **B**

Review questions 2

1. What is a mouse in relation to computing?
 - A) A small destructive rodent.
 - B) A round plastic container with a tail.
 - C) A device that controls a pointer on the screen.
 - D) A device used for typing.
2. Why is a screen also called monitor?
 - A) It monitors the user.
 - B) It helps the user to track computer operations.
 - C) It monitors system performance.
 - D) It is a television.
3. Pick the odd one out in the list below.
 - A) Calculator.
 - B) Mobile phone.
 - C) Robot
 - D) Laptop
4. Pick the odd one out in the list below.
 - A) Mainframe.
 - B) Microcomputer.
 - C) Minicomputer.
 - D) Digital computer.

Review questions 3

1. Which of the following will be most suitable for travellers.
 - A) Supercomputer
 - B) Mainframe computer.
 - C) Palmnote computer.
 - D) Minicomputer.
2. Why is a mobile phone regarded to be a computer?
 - A) It is electronic has a screen, keypad, memory and is programmable.
 - B) It looks like a palmnote.
 - C) It is portable.
 - D) It produces tones.
3. What is meant by the term analog data.
 - A) Data that never stops.
 - B) Discrete data.
 - C) Large data.
 - D) Continuous data.
4. Which one of the following is called a microprocessor?
 - A) The CPU of a mainframe.
 - B) The CPU of a minicomputer.
 - C) The CPU of a microcomputer.
 - D) The CPU of a supercomputer.

Answer of review questions 2&3

■ Questions 2

- C
- B
- C
- D

■ Questions 3

- C
- A
- D
- C

Review questions 4

1. Match the following generations of computers with the technology used to develop them.

1. First generation

A. VLIC

2. Second generation

B. Vacuum tubes

3. Third generation

C. Transistors

4. Fourth generation

D. Integrated circuits

2. Identify and explain at least five areas where computers are used in day to day activities.

3. What were the characteristics of first generation computers?

4. Who developed the analytical engine?

5. What is artificial intelligence?

6. Write the following initials in full:

A). ENIAC

B). VLSI

C). IC

Answer of review questions 4

1. First – Vacuum tubes
Second – Transistors
Third – Integrated circuits
Fourth – Large integrated circuits.
2. Supermarket, airport, hospitals, offices, banks, industries, etc.
3. A). Large in physical size
B). Used vacuum tubes
C). Produced a lot of heat.
D). Consumed a lot of power.
4. Charles Babbage.
5. Programs that make computers to mimic human intelligence.
6. ENIAC – Electronic Numeric Integrator And Calculator.
VLSI – Very Large Scale Integrated.
IC – Integrated Circuit.

Review questions 5

- Using an abacus represent 5780.
- Match the following computer application areas with the role played by computers in each case.
 - Supermarket
 - Hospital
 - Bank
 - Hotel
 - Home
 - School
 - Industry
 - Police station
 - A. Matching fingerprints
 - B. Entertainment
 - C. Stock control
 - D. Booking rooms
 - E. Analysing academic data
 - F. Manufacturing process control
 - G. Life support machines
 - H. Processing cheques

Answer of review questions 5

1. Representation of 57800 with ABACUS.



2. Supermarket – Stock control
Hospital – Life support machines
Bank – Processing cheques
Hotel – Booking rooms
Home – Entertainment
School – Analysing academic data
Industry – Manufacturing process control
Police station – Matching fingerprints

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Review questions 6-1

1. What is the name given to alternative sources of power?
 - A) **Generators**
 - B) UPS
 - C) **Power backups**
 - D) The sun
2. **Which of the following will not ensure proper ventilation in a room?**
 - A) Adequate windows and doors
 - B) **Overcrowding**
 - C) Installing fans
 - D) **Air conditioning system**
3. All the following are dangerous to a computer except one. Which one is it?
 - A) **Water**
 - B) Smoke
 - C) **Proper ventilation**
 - D) Dust

Review questions 6-2

4. Why must foods and beverages be kept out of the computer room?
- A) Because computer users should not eat.
 - B) Because spilling of beverages may clog and destroy computer components.
 - C) Because the smell of food is not good for the computer lab.
 - D) Because all foods affect computers.
5. Which one of the following statement is correct?
- A) Opening the system unit when it is still on.
 - B) Using magnets in the computer room.
 - C) Covering the computers with dust covers after shutting them down.
 - D) Stepping on power and data cables

Review questions 7-1

1. Why are powder fire extinguishers not allowed in the computer room?
 - A) Powder particles settle on storage devices and may scratch them during read/write operation.
 - B) Powder is poisonous.
 - C) It fills the room with mist.
 - D) Powder changes to liquid when sprayed on fire.
2. All the following are functions of the UPS except one. Which one is it?
 - A) It prevents sudden power surges to destroy the computer.
 - B) It supplies power to the computer during blackouts and brownouts.
 - C) It provides stable power supply (clean power).
 - D) It can be used as the main power source for computer.

Review questions 7-2

3. Which of the following reasons are likely to cause eye strain in the computer room.
- A) Poor lighting
 - B) Bright monitor
 - C) Poor ventilation
 - D) Antiradiation screen

Review questions 8

1. All the following are proper sitting postures while using a computer except one. Which one is it?
 - A) Straight posture on the seat back.
 - B) Feet firmly on the floor.
 - C) High enough seat allowing eyes to be level with top of the screen.
 - D) Bending the back backwards on a relaxing chair.
2. What can be done to deter illegal access to a computer room by unauthorised person?
 - A) Burglar proof the room by reinforcing doors and weak access points.
 - B) Welcome strangers to the room.
 - C) Leave the room open when nobody is using it.
 - D) Switch off security alarm when leaving the room

Answer of review questions 6,7&8

■ Questions6

- C
- B
- C
- B
- C

■ Questions7

- A
- D
- A and B

■ Questions8

- D
- A

Review questions 9

1. What is booting?
2. Differentiate between cold booting and warm booting.
3. What is the difference between function keys and special PC keys?
4. Explain the various categories of keys found on a standard keyboard.
5. What makes a mouse move a pointer on the screen?
6. Explain the correct procedure for shutting down one
7. Define the following terms:
 - A). Clicking;
 - B). Double Clicking;
 - C). Drag and drop;
 - D). Right clicking;
 - E). Mouse pointer;

Answer of review questions 9-1

1. Booting refers to process whereby a computer goes through a process of self test and preparation for use.
2. Cold booting is starting up a computer while warm booting is restarting a computer.
3. Function keys are specifically used to perform certain program specific tasks. Special purpose keys are used to give certain commands. They are mostly used in combination with other keys.
4. Alphanumeric keys, function keys, cursor movement and editing keys, special purpose keys and numeric keypad keys.
5. Moving the mouse on any direction on a flat surface.
6. Click start, turn off computer then turn off.

Answer of review questions 9-2

7. A). Clicking – pressing and releasing the left mouse button once.
- B). Double clicking – pressing the left hand side button twice in quick succession.
- C). Right clicking – pressing the right mouse button once displays a list of commands from which the user can make a selection.
- D). Drag and drop – this is where the user drags an item from one location on the screen to another.
- E). Mouse pointer – is an arrow or an object in form of a picture that is used to point on the task to be performed on the application window.

Revision questions 1

1. Explain why smoke and dust particles are harmful to a computer.
2. Explain the emerging trends in microcomputer technology in relation to size.
3. Describe the ideal environment for a computer to work properly.
4. Explain the term *system unit* and name some of components found in it.
5. What is booting? Explain what happens in the computer during the booting process.
6. State one reason why a computer needs to be connected to a stable power source.
7. Give two examples of special purpose computers.

Answer of revision questions 1

1. Dust and smoke settles on storage devices scratching them during read/write operation.
2. PCs are becoming small and portable e.g. Personal Digital Assistant (PDA).
3. Free from dust, water, magnets, well ventilated rooms, medium humidity, etc.
4. This is the casing that houses the CPU and storage devices. Components in the system unit includes CPU, motherboard and storage devices.
5. Starting up a computer. Internally it first checks whether all the components are in good working condition then loads the *operating system*.
6. To avoid damage and lose of data.
7. Mobile phones, calculators, robots etc.

Revision questions 2

1. Why would it not be good to install water based fire extinguishers in the computer room.
2. Explain the following terms:
 - A) Clicking the mouse,
 - B) Right clicking the mouse,
 - C) Double clicking the mouse,
3. What precaution would you take in the computer room in case:
 - A) The humidity falls below normal for prolonged periods due to weather change;
 - B) Users complain of backaches after long periods of using the computer;
4. Classify the following keyboard characters:
 - A). A,B,C,.....Z
 - B). 0,1,2,.....9
 - C). F1, F2,.....F12
 - D). Del, Insert
 - E). Home, End, Page up, arrow key
 - F). Ctrl, Shift, Alt

Answer of review questions 2

1. Water causes rusting of metallic parts and short circuits if used.
2. A). Clicking – pressing and releasing the left mouse button once.
B). Double clicking – pressing the left hand side button twice in quick.
C). Right clicking – pressing the right mouse button once displays a list of commands from which the user can make a selection. This list of commands is called a **shortcut menu** or **context sensitive** menu. It is called a context sensitive menu because the commands on it apply to the right-clicked item.
3. A). Install humidifiers in the room.
B). Improve furniture to avoid bending when using the computer.
4. A). Alphanumeric keys
B). Numeric keypad keys
C). Function keys
D). Editing keys
E). Cursor movement keys
F). Special purpose keys.

Practical activity 1

- Using a typing tutor program type the text appearing in italics.

in our minds, in our memory, in our concentration.

In our retaining power, in our intelligence.

Right from the crown of our head to the very soles of our feet.

God, keep us FREE today from evil,

Sin, temptations, attacks and afflictions,

Fear of men, sickness, disease, doubts, anger,


All calamities and from all that is not of thy Kingdom.

*Fill us with the gifts of wisdom, knowledge, faith,
understanding,*

And discernment.

Practical activity 2

1. Using one of the computers in the computer laboratory, identify the visible parts of a computer and write down the following details:
 - A) The brand name of the computer.
 - B) The type of computer – whether desktop, laptop etc;
 - C) The number of buttons on the mouse;
 - D) The number of keys on the keyboard;
 - E) Draw a diagram of the keyboard layout;
 - F) Identify the power button on the system unit and the monitor;
 - G) Use the buttons on the monitor to adjust its brightness.
2. In group, carefully study the computer laboratory and its arrangement. Note down the following;
 - A) The safety precautions in place to protect users and computers;
 - B) Users complain of backaches after long periods of using the computer.



Chapter 2

Computer system

Introduction

- Computer system refers to a collection of components that are linked to process, store and manage information.

Functional organisation of the elements

- The computer system is organised into three elements.
 - Hardware – consists of the mechanical, electrical and electronic part of a computer.
 - Software – it is a set of computer programs that guides the computer in each and every activity that happens inside the computer during data processing.
 - Live ware – refers to users who are computer knowledge and hence can properly utilize the computer hardware and software.

Input device

- These are devices which accept data and pass them into the computer.
 - Keying devices – keyboard use to type data into the computer.
 - Pointing devices
 - Mouse
 - Track ball
 - Joy stick
 - Light pen
 - Scanning devices – they are devices that capture data into the computer directly.

Types of keying devices 1

Flexible keyboard



Ergonomic keyboard



- Flexible keyboard — is a more portable keyboard that can be folded and packed in to bag.
- Ergonomic board — is specially designed to provide comfort and alleviate wrist strain.

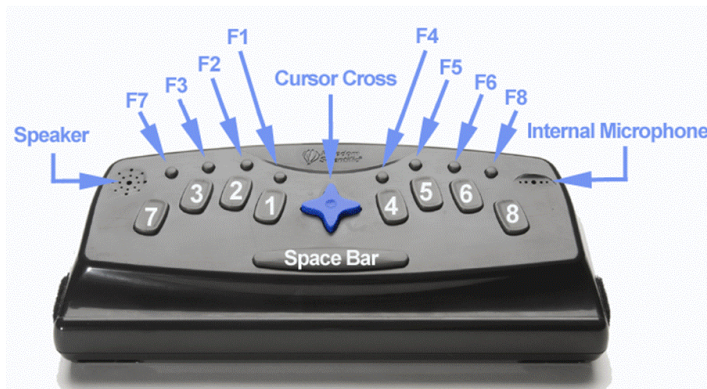
Types of keying devices 2

Keypad



- Keypad – is a miniature keyboard used on portable devices such as PDAs, laptops and mobile phones.

Braille keyboard



- Braille keyboard – is a keyboard designed for use the blind. It consists of key identified by raised dots.

Mouse (Pointing device)

Traditional mouse



Optical mouse



- This is for entering data or instructions by controlling a pointer on the screen.

Codeless mouse



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Trackball (Pointing device)



- Trackball – It uses a sphere located on top that is rotated by hand to control cursor movement.

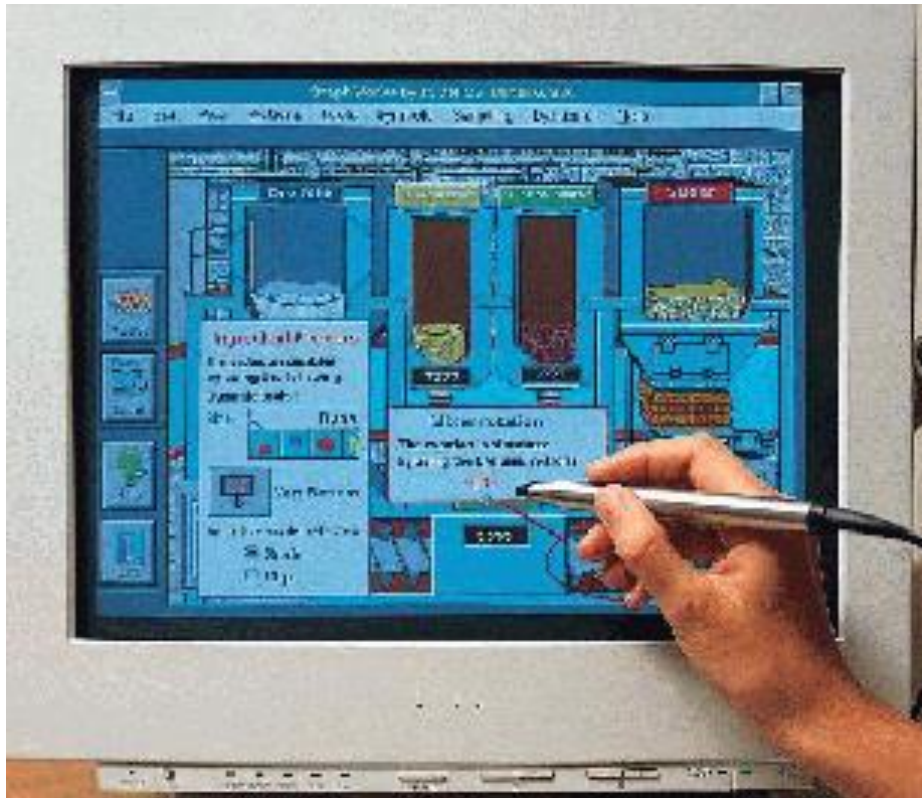
Joy stick (Pointing device)



- It looks like a car gear lever which can be moved sideways, upwards, downward to no space control the position of cursor.

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Light pen (Pointing device)



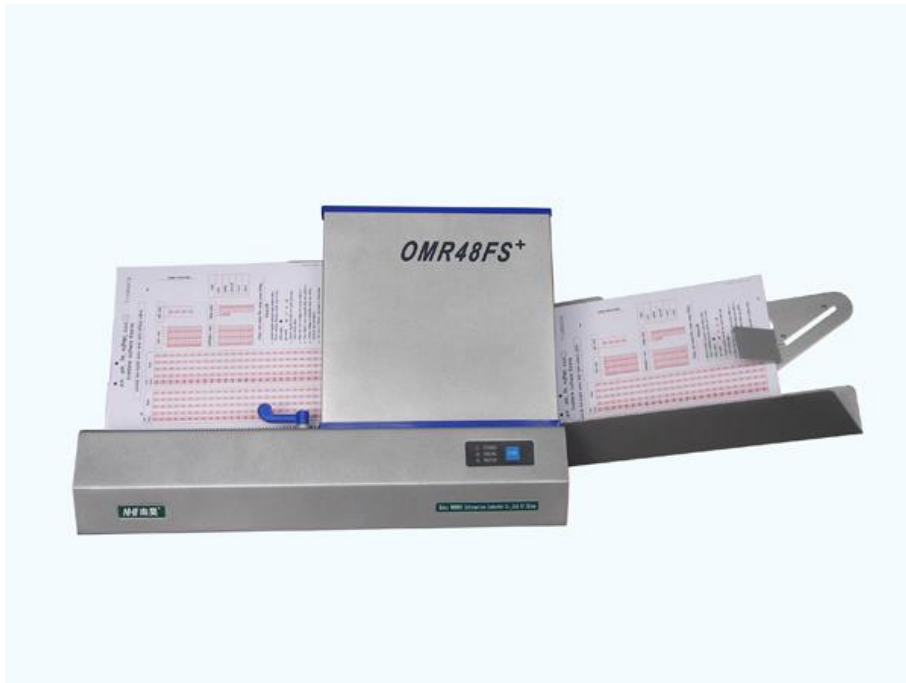
- It is a hand held pen like device that has a light sensitive point.

Classification of scanners

- Optical scanners – they capture data using light.
 - Optical Mark Recognition (OMR)
 - Optical Bar Recognition
 - Optical Character/Image Scanner (OCR)
- Magnetic scanners – they capture data using magnetic technology.
 - Magnetic Ink Character Recognition (MICR)
 - Magnetic Stripe Recognition

Optical Mark Recognition (OMR)

(Optical scanner)



- This scanner uses mark – sensing to scan and translate the locations of a series of pen or pencil marks into computer understandable form used in marking K.C.S.E. multiple choice exam, questionnaire etc.

■ Application of OMR

- Multiple choice exam.
- Market research questionnaires.
- Payroll data entry.
- Traffic surveys.

Advantages and disadvantages of OMR

Advantages

- Has low error rates.
- Conspicuous errors are easily corrected.
- Data captured at source, hence minimising amount of manual work.

Disadvantages

- Mark readers are relatively slow.
- Verification of marked data is difficult.
- Not widely used in business.

Optical Bar Recognition (OBR)

Barcode reader



Barcode



(Optical scanner)

- They scan and translate a bar code into machine understandable mode. Used in supermarket, wholesale shops etc.
- Application of OBR
 - On labels and on shelves for stocktaking.
 - Printed on shop goods e.g. supermarkets.
 - In libraries.

Advantages and disadvantages of OBR

Advantages

- Bar codes can be printed by normal printing methods.
- The type of item or price does not have to be repeatedly written/typed.

Disadvantages

- Bar codes can only be read machines
- Only numbers can be coded in this way.
- They are relatively fixed, so they are unsuitable for recording prices which can frequently change.

Optical Character/Image Scanner (OCR) (Optical scanner)



- It is used to scan characters and images i.e. can be used to scan real objects.

- Application of OCR
 - Used in billing

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Advantages and disadvantages of OCR

Advantages

- Data is captured at source hence errors are limited.
- **It's an easier method to use.**
- Document design is less complicated.
- **Characters can be read by people.**

Disadvantages

- **Optical readers are expensive.**
- OCR may require redesigning quite frequently.
- **Only certain font is acceptable.**

Magnetic Ink Character Recognition (MICR) (Magnetic scanner)



- This scanner is able to detect characters written in special magnetic ink. It is used in banks to read cheques, credit cards etc.

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- Application of MICR
 - Banking industry for cheques.

Advantages and disadvantages of MICR

Advantages

- It's fast, accurate and automatic.
- The code are both machine and human readable.
- Reduces forgery i.e. it's difficult to forge.

Disadvantages

- MICR system is limited to only 14 characters.
- MICR system is based on magnetism and can easily be damaged.

Magnetic Stripe Recognition

(Magnetic scanner)



- A magnetic stripe is a thin magnetic tape, often found at the back of a plastic card e.g. ATM card. The magnetic stripe is used to recognise the data in such cards.
- Application of magnetic stripes
 - On credit cards.
 - On bank cards.
 - As tags on clothes.
 - As a phone card.

Advantages and disadvantages of magnetic stripes

Advantages

- Simple to produce.
- Not easy damaged.
- Stores fairly large numbers of characters.

Disadvantages

- Data can be changed or erased by magnetic fields.

Speech recognition devices

Headset



- This is a type of input method where microphone is used to enter data in form of spoken words into the computer.
- Application area of speech recognition
 - Security and access control e.g. office security for room access, house/car security.
 - Quality control and automatic in factories i.e. speech input used to order robots.
 - Automated materials handling – in airports to direct luggage to appropriate conveyor belt.
 - Voice activated toys and games.

Advantages and disadvantages of speech recognition

Advantages

- No keyboards in necessary i.e. very fast.
- Useful in situations where
 - hands or eyes are busy handling documents etc.
 - People are moving around, since wireless microphone can be used.
- Can be used from remote locations via the telephone.

Disadvantages

- Homophones – some words sound the same.
- Recognition is slow.
- Limited vocabularies.
- Background noise can disrupt the data entered.
- Speaker variability i.e. the speed, pitch, loudness, pronunciation of individuals.

Types of other digital devices

(Touch screen and digital camera)

Touch screen



Digital cameras



- Touch screen – this device recognises the location of a contact on the screen through a built-in grid of sensing lines and sensors.
- Digital camera – they are used to take electronic pictures of an object.

Types of other digital device

(Digitizers)



- It has graphic tablet on which the user writes on using a device similar to a pen (stylus). The stylus moves on the tablet and the drawing is directly reflected on the screen.

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Types of other digital devices

(Interactive whiteboard)

Smart board



- An interactive whiteboard also as a smartboard is a large interactive display that connects to a computer. The computer display is projected onto the board's surface, where users control the computer and write using a pen or finger. The board is typically mounted to a wall or on a floor stand.

Selecting an input device

- Factors to consider while selecting an input device
 - Cost
 - Volume
 - Reliability
 - Accuracy
 - Mode of operation
 - Appropriateness

Output device

- Output devices are peripheral devices that a computer uses to give out information produces after processing.
 - Soft copy – refers to the intangible mainly displayed on the screen to through devices like speakers.
 - Hard copy – refers to tangible output produced on papers e.g. by printers, potters etc.

Examples of soft copy devices

- Monitor (Visual Display Unit) VDU – it displays information on its screen thus helping the user monitor operations carried out by the computer.

Types of monitors

Monochrome monitor



Colour monitor



- Monochrome monitor – it displays image and text in only one colour mostly black and white.
- Colour monitor – it displays images and text in multiple colours.

Types of displays screen (CRT)



Characteristics

- The screen of CRT is curved slightly outward.
- They are not portable.
- They consume a lot of power.
- They are cheap.

NB; CRT means
Cathode Ray Tubes

Types of display screen

(flat panel displays)



Characteristics

- **The screen is flat.**
- They are portable.
- **Consume less power**
- Occupy less space.
- **Are expensive.**
- Provides high quality output.

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Example of flat panel displays 1

Liquid Crystal Display (LCD)



Thin film transistor



- Liquid Crystal Display (LCD) – they have tiny liquid crystals that reflect light falling on them from environment.
- Thin Film Transistors (TFT) – it provides high quality output (text and graphics).

Example of flat panel displays 2

Electro luminescent



Gas plasma display



- Electro Luminescent (EL) – they glow rise to an electroluminescent display, images are clearer than LCD.
- Gas plasma – they use gas that emits light when electric current is passed through them.

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Graphic adapter/video card

- Graphic adapter it's a piece of circuit board that connects a monitor to a computer and allows the computer to show images and text on its screen.

Examples of graphic adapters

- Monochrome Displays Adapter (MDA) – it displays text only in one colour.
- Hercules Graphic Card (HGC) – displays both text and images in one colour.
- Colour Graphic Adapter (CGA) – displays text and images using up to 16 colours.
- Enhanced Graphic Adapter (EGA) – displays text and images using 16 colours.
- Video Graphic Arrays (VGA) – offers 256 colours.
- Super Video Graphic Array (SVGA) – offers over 256 colours.

Advantages and disadvantages of VDU

Advantages

- The display of output is almost instantaneous.
- Minimises paperwork.

■ Disadvantages

- Can lure computer operator into not keeping hardcopy records.
- Screen might not allow the viewing of the full array of data.

Sound output



- Sound output is in form of spoken words. Speakers are used to output the sound from computers e.g. music, warnings, videos etc.
- Application of sound output
 - Learning aids e.g. computer aided learning.
 - Lifts – messages can be used in lifts to greet visitors and tell them the floor they are in.
 - Emergency messages i.e. public address systems, in cars when running out of petrol, household e.g. vacuum ‘cleaners tub is overloaded’.
 - Text to speech translation for blind.

Advantages of sound output

Advantages

- No reading is necessary.
- Useful in situations where you can't look or where you are busy.
- Fast, natural output.
- People grow fond of "computer speak".

Disadvantages

- Not suitable for noisy situations.
- Inappropriate for lengthy or permanent information.

Data projectors



- They are used to output from a computer onto a plain white screen like a wall or whiteboard. It is a creative way of presenting computer output to an audience. This technology is gradually replacing the traditional overhead projectors.

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Light Emitting Diodes

- They are light emitting components that display light when an electric current is passed through them. It is used mainly for warnings e.g. the red and green light displayed by the system unit to help the user know whether it is ON or OFF.

Hardcopy output devices

- Hardcopy devices are devices that produce output on paper in form of text or graphics.

Example of hardcopy

- Printers – produce a hard copy of information on papers.
- Plotters – it's a type of hard copy output. They are used mainly in the field of engineering and architecture for producing graphical output on paper.
- Computer output on microform – the com devices record computer output (image or text) on to photographic film which can be viewed later by special microfilm readers.

Classification of printers

- Printers are categorised as follows;
 - How they produce characters on paper.
 - Impact printers – they provide prints by printing head element coming into actual contact with the stationery through inked ribbon.
 - Non-impact printers – they provide prints by the print head elements not coming into actual contact with the stationery, but other means e.g. thermal.
 - The speed at which they print.
 - Character printers – they produce one character at a time e.g. daisy wheel, dot matrix etc.
 - Line printers – they produce one line at a time e.g. drum, chain etc.
 - Page printers – they produce an entire page at once e.g. laser printer.

Differences between impact and non-impact

Impact	Non-impact
Slow	Faster
Use inked ribbons	Use thermal or electrostatic principles
Cheaper	Costly
Noisy	Quiet
Multiple copy production possible	Multiple copy production almost impossible

Types of impact printers 1



- Dot matrix printer – it's an impact character printer that provides character prints in terms of dots. The printing head element is made up of a set of arranged needles, which are activated depending on the character to be formed for printing.

Types of impact printers 2

Daisy wheel printer



Golf ball printer

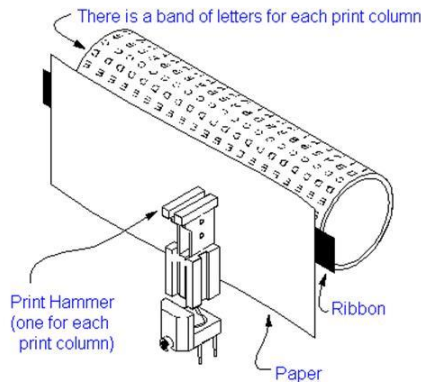


- Daisy wheel printer – it has a wheel petals on which characters are mounted. When printing, the wheel rotates allowing petals to hit a ribbon with different character.
- **Golf ball printer – the character images are incorporated on the surface of a gold ball like print head, which is either rotating or pivoted.**

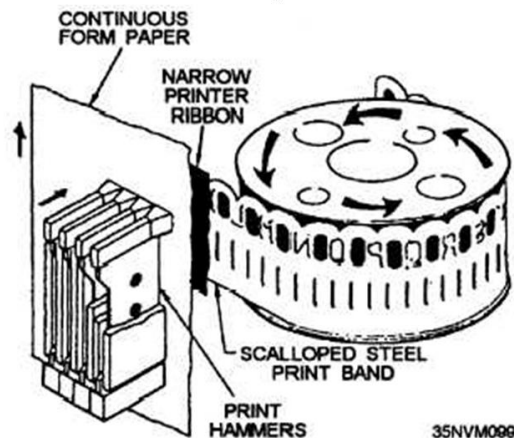
Types of impact printers 2

Drum printer

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Chain printer



- Drum printer – it provides one whole line print at a time. The characters are incorporated on circular bands that move round the surface of the drum surface.
- Chain printer – it's an impact line printer that incorporates engraved characters printing slugs at high constant speed past printing positions.

Types of non-impact printers 1

Inkjet printer

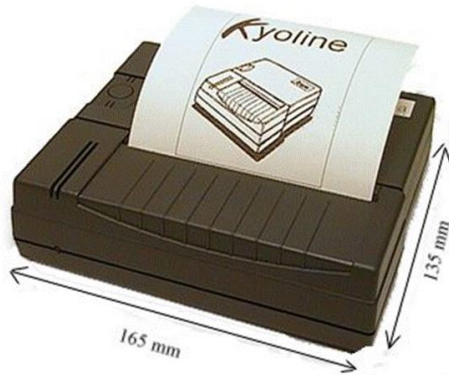


- Inkjet printer – this printer forms characters by spraying ink from tiny nozzles through an electrical field that arranges the charged ink particles into characters.

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Types of non-impact printers 2

Thermal printer



Electrostatic printer



- Thermal printer – it's non-impact character printer that provides character prints using heat principles.
- **Electrostatic printer** – it's a non-impact that uses electrostatic charges to form characters in a line on a special paper.

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Types of non-impact printers 3

Laser printer



- Laser printer – it prints by passing a laser beam back and forth over a rotating drum.

Photoprinter



- Photo printer – are special purpose printers designed to print photos.

Selecting a printer

- Factors to consider when selecting a printer
 - Initial cost and subsequent costs of maintenance.
 - Volume of printing expected reports.
 - Nature of reports to be generated.
 - Range of capability for selected printers e.g. multiple copier, print styles etc.
 - Interface with the computer system.
 - Speed.
 - Quality of prints.

Type of plotters

Flat bed plotter



- Flat bed plotters
- Drum plotter

Drum plotter

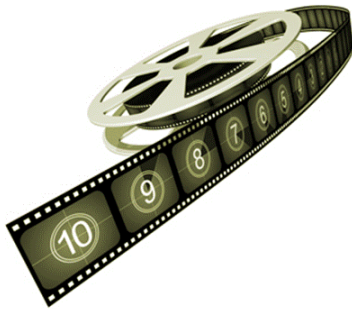


Computer output on microform (COM)

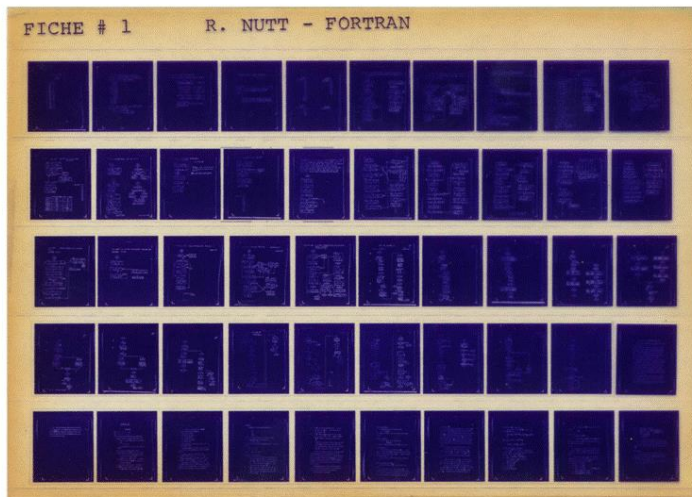
- The com devices record computer output (images or text) on to photographic film which can be viewed later by special microfilm readers.
- Applications of COM
 - Libraries for book catalogues.
 - Local authorities to retain town plans, maps, statistics etc.
 - Companies to store personal and customers records.

Types of microform

Microfilm



Microfiche



- Microfilm - the output is usually on a roll of film.
- Microfiche – the output is on a page of film on which data images are arranged in a grid of patterns.

Advantages and disadvantages of COM

Advantages

- Saves on stationery and space.
- Faster than printing.
- Non-bulky hence portable.
- Contents on COM are not easily read using naked eyes hence guaranteed security.
- Have got larger life span compared to paper output.

Disadvantages

- Are expensive.
- Cause eye-strain.
- Additional equipments needed to read to contents.

Review questions 1-1

1. What is a computer system?
2. Differentiate between a computer and a computer system.
3. A scanner used at points of sale terminals in supermarkets is an example of a () scanner.
4. The automated input technique where keying of input data is eliminated is sometimes referred to as ().
5. The type of scanner used to grade multiple choice examination is called ().

Review questions 1-2

6. Name three factors one would consider when selecting data entry method, and give a reason why each is important.
7. Describe three different optical and two magnetic scanning techniques used for input; give an example of the use of each.
8. Explain how banks use MICR scanners for cheque processing.
9. Describe two situations in which speech recognition devices may be useful as a method of data entry.
10. Optical scanning of the universal product code is now widely used as input method. Give an example of a place where it is used and explain how it is used.

Answer of review questions 1

1. A computer system refers to hardware, software and liveware that work together to process and manage information.
2. A computer is made up both hardware and software while a computer system integrates hardware, software and user.
3. Barcode reader.
4. Data capture.
5. Optical mark reader (OMR).
6. The user's needs, Type of data to be input, Volume of data entry, Cost, availability, etc.
7. Optical – OMR, OBR and OCR.
Magnetic – MICR and Magnetic strip.
8. Special magnetic characters are written on cheques that can only be detected by MICR reader.
9. For people with special needs (disabilities), In language translator programs, Voice tags for voice dialling.
10. Supermarket and superstores. To capture price of goods from bar codes.

Review questions 2

1. Differentiate between soft copy and hard copy.
2. What is the difference between a CRT monitor and a flat-panel display.
3. Give three examples of flat-panel monitors available in the market today.
4. Name four criteria used when selecting a printer.
5. Distinguish between impact and non-impact printers and give two examples of each.
6. State one advantage and one disadvantage of laser and inkjet printers respectively.
7. Give two advantages of sound output devices.
8. *Karuri Road Construction Company (KRCC)*, intends to buy an output device they can use to produce road maps. Which device would one advice the company to buy and why?

Answer of review questions 2-1

1. Hardcopy is intangible information, e.g. printout on paper like letters, while softcopy is intangible information, e.g. screen display or music.
2. CRT monitor uses a cathode ray tube while a flat panel does not. CRT has protruding back while flat panel does not.
3. Liquid Crystal Display (LCD), Thin Film transistor (TFT), Gas plasma display and Electro luminescent (EL).
4. Cost, print quality, availability, speed, purpose and print technology.
5. Impact printer – print by striking mechanism and are noisy, e.g. dot matrix and daisy wheel.

Non-impact printer – print by either laser, ink or thermal transfer mechanism, e.g. laser jet, inkjet and thermal printers.

Answer of review questions 2-2

6. Advantage of:
Laser printers – cheap running cost, good print quality.
Inkjet printers – cheap to purchase, cheaper multiple colours printing, high quality print.
- Disadvantage of:
Laser printers – expensive to purchase, expensive multi-colour printing.
Inkjet printers – expensive to buy cartridges (run), water based print easily fades.
7. Enable reception of output even when a few meters away from computer, Makes computing interesting and entertaining, Suitable for the blind and people with poor sight.
8. A plotter – it draws lines and big charts.

Chapter 3

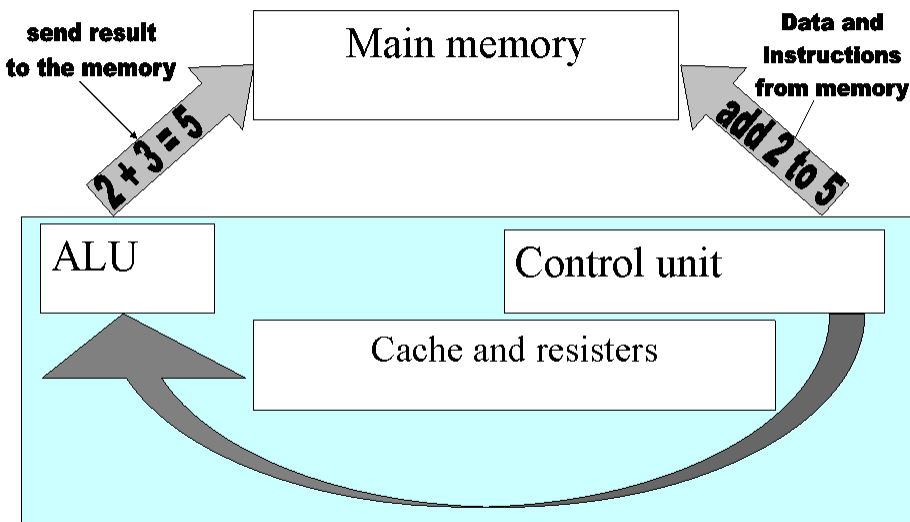
Central Processing Unit (CPU)

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Introduction

- The Central Processing Unit (Processor) is that part of the computer that decodes and executes instructions.

Functional units of CPU



- Arithmetic Logic Unit (ALU) – in this unit of CPU all the arithmetic and logical operations are carried out.
- **Control unit** – this unit coordinates all processing activities in the CPU as well as input, storage and output operations.
- Main memory (primary storage) – this unit provides storage location for data and instructions accessed by the control unit.

Functions of ALU, Control unit and main memory

■ ALU

- Does all the mathematical computations in a computer. Does all of the logic comparisons of values.

■ Control unit

- Directs the flow of information into the CPU memory and storage. Controls the instructions the CPU will perform next.

■ Main memory

- Holds data awaiting processing.
- Holds data that has been processed awaiting to be output.
- Holds data been processed.

Types of memory (ROM)



- Read Only Memory (ROM) – this memory is used to store programmed instructions and data permanently or semi permanently. Data and instructions stored in ROM are those required to remain unchanged for a long time.

Characteristics

- Can only be read but cannot write on it.
- **It's non-volatile.**
- Stores permanent instructions from manufacturer.

Types of memory (RAM)



- Random Access Memory (RAM) – it's called Random Access Memory (RAM) because its content can be read directly regardless of the sequence in which it was stored.

Characteristics

- Data can be read and written in it.
- It's temporary, its contents disappears when the computer is switched off.
- It's contents is user defined.

Types of ROM

- Mask Read Only Memory (MROM) – once contents are written on it by the manufacturer, it cannot be changed.
- Programmable Read Only Memory (PROM) – this allows the user to alter it only once after the content is written on it.
- Erasable Programmable Read Only Memory (EPROM) – the contents stored in this memory can be erased by exposing them to ultra violet light and then reprogrammed for another use.
- Electrically Erasable Programmable Read Only Memory (EEPROM) – this memory can be erased and reprogrammed using electricity.

Types of RAM

- Static RAM (SRAM) – it's a very fast memory and holds its content as long as there is power.
- Dynamic RAM (DRAM) – it holds its contents for a short while even when the power is on. To maintain its content it must be refreshed severally per second.

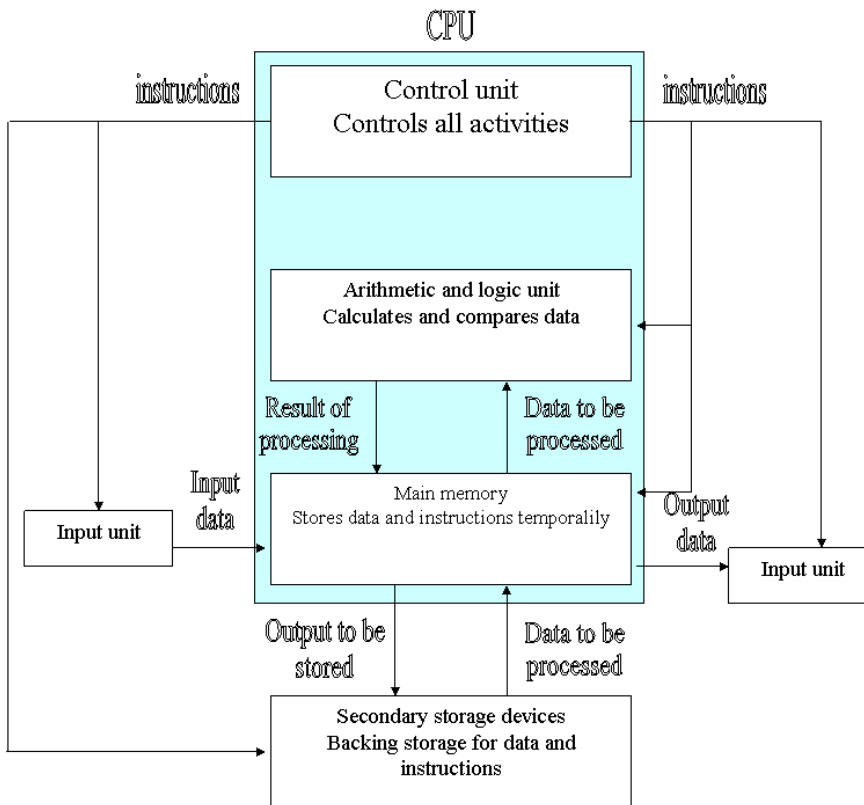
Special purpose memories

- Buffer – it's a special purpose memory used during input/output or processing to temporarily hold data or instructions between communicating elements.
- Cache memory – it's a very high speed type of SRAM whose purpose is to allow the processor to access data instructions more faster.
- Register – they are temporarily storage locations within CPU that holds one piece of data at a time.

Examples of registers

- Accumulators – temporarily holds the results of the last processing step of ALU.
- Instruction registers – temporarily holds an instruction before it's interpreted into a form that CPU can understand it.
- Address registers – temporarily holds next piece of data waiting to be processed.
- Storage registers – temporarily holds a piece of data that is on it's way to and from the CPU and main memory.

Functional organisation of CPU



- The arithmetic logic unit, control unit and main memory are linked through electrical pathways called buses. A bus is an electrical path for signal to flow from one point to another in a circuit.

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Types of computer buses

- Control bus – this is a pathway for all timings and controlling functions sent by the control unit to other parts of the system.
- Address bus – this pathway is used to locate the storage position in memory of the data to be executed or an instruction to be decoded.
- Data bus – this is the pathway where the actual data transfer takes place.

Types of processors and their clock speed

Processor	Year of manufacture	Clock speed	Number of transistors
Intel 8086 & 8080	1979	4.7 – 10 MHz	30,000
Intel 80286	1982	10MHz	130,000
Intel 80386	1985	16MHz	275,000
Intel 80486	1989	66MHz	12,00,000
Pentium	1993	200MHz	3,300,000
Pentium pro	1995	200MHz	5,500,000

Processor	Year of manufacture	Clock speed	Number of transistors
Pentium mmx	1997	233MHz	7,500,000
Pentium II	1998	300MHz	7,500,000
Pentium III	1999	550MHz	7,500,000
Pentium IV	2000	2,000MHz	7,500,000

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Review questions 1

1. Define the term central processing unit?
2. Describe three functions performed by the CPU.
3. What is a microcomputer?
4. Explain the functions performed by:
 - A) The control unit;
 - B) The arithmetic and logic unit;
 - C) The main memory;
5. Define the terms: *volatile memory* and *non-volatile memory*.
6. Define and explain the difference between Ram and ROM.
7. How many characters (bytes) of data are held in each of the following memories? 4KB, 640KB, 16MB and 20GB?

Answer of review questions 1

1. Central Processing Unit.
2. Processing data, System control, Provide temporary storage (RAM) and permanent storage (ROM).
3. It is a tiny processor, mainly a combination of the ALU and control unit on a single silicon chip.
4. A). Interpreting instruction, Issuing control instructions the O/S.
B). Performing arithmetic calculation, Performing logical operations.
C). Holding data just before and after processing, Holding instructions just before execution.
5. Volatile memory is temporary while non volatile is permanent.
6. RAM – temporary and rewritable memory
ROM – permanent and read only memory.
7. 4KB – approximately 4000 characters.
640KB – approximately 640,000 characters.
16MB – approximately 16 million characters.
20GB – approximately 20 billion characters.

Review questions 2

1. Name three special purpose memories found either inside or outside the microprocessor, and explain what each does.
2. In reference to arithmetic and logic unit, explain the meaning of *logic operations* and give an example of this processing operation.
3. What is the meaning of BIOS, and what role does it play in a computer?
4. Explain the purpose of the system clock.
5. What is the meaning of BIOS, and what role does it play in a computer?
6. List three buses found in the CPU.

Answer of review questions 2

1. Cache memory – speeds up processing (fetch cycle).
Buffer – acts as interface between very fast processor and slow I/O devices.
Register – temporarily holds data/instructions just before and after processing.
2. Comparisons include: =, <, >, and <>.
3. The CPU of a microcomputer is smaller and less powerful than that of mainframe.
4. Determines the processing speed of the CPU.
5. Basic Input Output System – holds hardware setup and configuration information.
6. Data bus, address bus and control bus.

Practical activity 1

- With the help of the teacher, find out the following:
 1. The type of processor in one of the computers in your computer laboratory.
 2. The clock speeds of all the computers in the computer laboratory.
 3. What is the size of RAM in MB of the computer you are currently using?

Chapter 4

Secondary storage devices

Introduction

- These are storage devices that compliment the primary memory. They are used to store information for longer period.

Characteristics of secondary storage

- Non-volatile storage – data stored in this media is permanent unless erased by user
- Mass storage – stores large volume of data
- Reusability – stored data can be erased and the media reused to store fresh data and programs

Classification of secondary storage

- Removable storage devices – these devices are not housed inside the system unit hence can be used in another computer e.g. floppy, flash disk, CD.
- Fixed storage devices – these devices are housed inside the computer system unit e.g. hard disk.

Removable storage devices

- Magnetic disks

- Floppy disks

- Zip disk

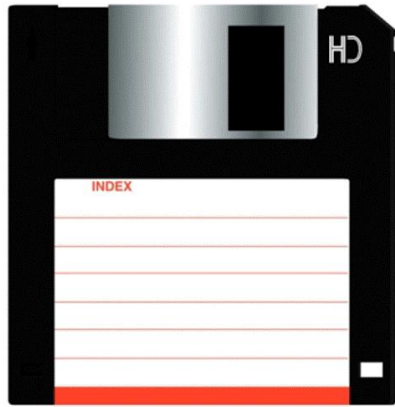
- Jaz disk

- Magnetic tapes

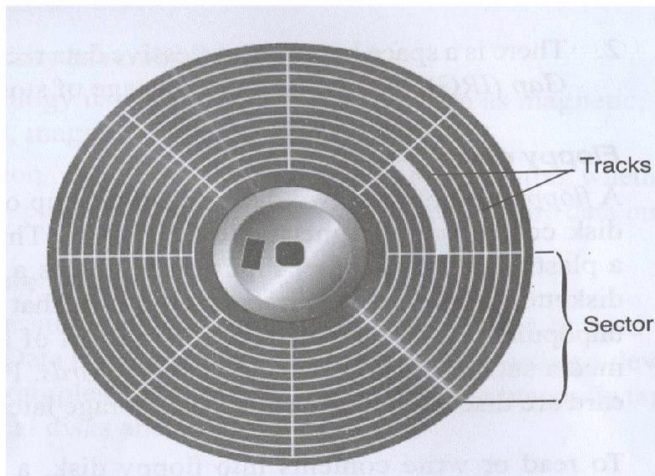
- Optical disk – these disks use laser beam to record data on them. The laser ray burns tiny holes into a shiny surface to record data.

Floppy disk

Floppy disk



Structure of floppy disk platter



- They are made of small flexible round disk coated with iron oxide. They are used to store information for later use in the same or different computer, and can be used to move information from one computer to another.

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Zip disk



- Zip disk – they resemble floppy disk but have high storage capacity. They are slightly larger and thicker in size. Can hold at least 250MB. Mostly they come with a separate portable external zip disk.

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Jaz disk



- Jaz disk – they are small portable of about 1GB – 2GB. They are used for storing data that require larger capacity. They have an external jaz drive.

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Advantages and disadvantages of floppy disk

Advantages

- They are very cheap.
- Small, lightweight and convenient.
- Exchangeable.

Disadvantages

- Floppies are vulnerable i.e. short life.
- Time consuming if access is needed to many files over a short period.
- Easily damaged.
- Storage area is limited.

Magnetic tapes



- This is ribbon of Mylar (plastic – like) material coated with a thin layer of iron oxide. Magnetic tape resembles the music cassette. Tape is stored in blocks separated by inter – block gaps left for stopping purposes. Tapes are sequentially accessed. This implies that if information is at the end of the tape, the computer will have to read almost the entire tape which is time consuming.

Advantages and disadvantages of magnetic tapes

Advantages

- They are portable.
- Cheap.
- Can be erased and re-used.
- Holds a lot of data in a compact space.

Disadvantages

- Very slow in accessing of data.
- Easily damaged i.e. dust, heat, touching etc.
- The inter-block space is wastage of storage area.

Examples of optical storage disks

- LS-120 super disk – this is a diskette that resembles the floppy disk but uses optical technology instead of magnetic technology to read data. It has greater storage capacity and greater speed of data access than floppy disk.
- Digital Versatile Disks (DVD's) – also known as digital video disk. They resemble compact disk but have higher storage capacity of up to 17GB. They are suitable for recording motion pictures e.g. video because they offer better sound and picture quality than CDs.
- Compact disk (CD) – they hold larger quantities of data and information. It holds as much as 700MB. Mostly used to store data and information that require a lot of space e.g. video clips, software etc.
- Optical card – it resembles the magnetic ink character reader card but uses an optical recordable stripe that stored using optical technology.
- Photo CD – this CD is used to process photographic film or negatives to produce and store high quality photographs on a CD-R.

Forms of compact disks

- CD-ROM (Compact Disk-Read Only Memory) – in this type of compact disks, when data is recorded on them, one can neither change them, nor add anything on.
- CD-R (Compact Disk-Recordable) – they are initially blank, the user can record data on it. However once the data has been written on it, one can only read but no changing it.
- CD-RW (Compact Disk Rewriteable) – with CD-RW the user can record, erase and rewrite new information.
- WORM (Write Once Read Many Times) – these are discs that allow the user to record data on them once but read them many times e.g. CD-ROMs and CD-Rs.

Advantages and disadvantages of CD-ROM

Advantages

- It's smaller, more portable and has larger storage compared to diskettes.
- More secure as it cannot be changed or attacked by viruses.

Disadvantages

- Not possible to change data written on a CD-ROM.
- Are expensive than diskettes.
- Can't erase the data stored.

Advantages and disadvantages of optical storage

Advantages

- **Have massive capacity.**
- Stores data permanently.
- **Accessing of data is fast.**
- Secured i.e. it's hard to copy.
- **High quality pictures and sound.**
- Portable.

Disadvantages

- Expensive.
- **Costly hardware and software for reading.**
- Break easily (it's fragile).
- **Very sensitive to things like dust, water, heat, scratches which easily damage them.**

Flash disk

Flash disk



Memory stick

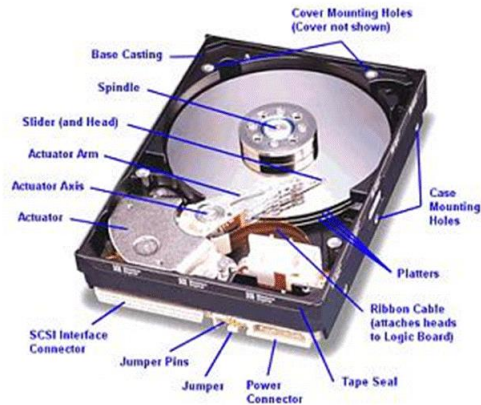


- This is the most current storage device in the market. It has a massive storage area, more reliable and portable. It's small in size and can store over 600MB of information.

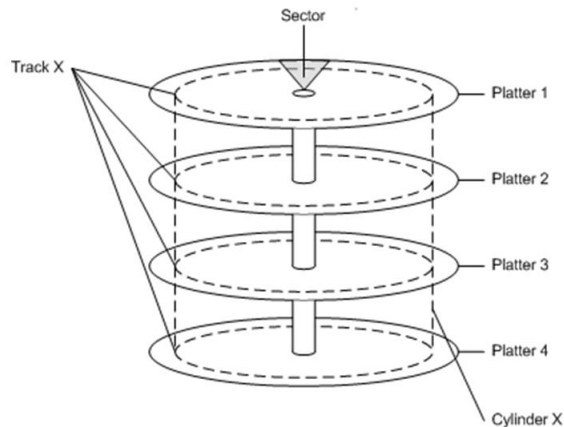
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Example of fixed storage devices

Hard disk drive



Disk platters stacked into a cylinder



- Hard disk (Winchester) – they are made from metal and are coated with a thin film of magnetic oxide. The hard disk unit is made of shiny, rigid magnetic disks or platters that are arranged vertically on a common axis. They can hold thousand of programs and files.

Advantages and disadvantages of hard disk

Advantages

- It's cheap.
- Very reliable.
- Does not deteriorate as quickly as floppy.
- More storage capacity.
- Accessing of data is faster.

Disadvantages

- They can suffer a head crash resulting to loss of data.
- They are sensitive to things like dust, humidity, magnets which can corrupt the data stored.
- They are inflexible i.e. cannot be changed.

Review questions 1

1. Distinguish between primary and secondary storage devices.
2. Distinguish between removable and fixed storage.
3. Compare three types of removable disks i.e. floppy, zip, and jaz disks in relation to size.
4. What is a hard disk? How does it differ from the floppy disk?
5. What are the advantages of the hard disk over the floppy disk?
6. Give four examples of optical disks and how they differ from each other in terms of storage capacity and mechanism.

Answer of review questions 1

1. Primary storage is accessed directly by CPU while secondary is not.
2. Removable are portable while fixed are mounted inside the system unit.
3. Floppy – physically small in size and capacity. Jaz&Zip are slightly large in size and have large storage capacity.
4. It is hard magnetic platter used to store data and is encased in a metallic housing (casing). It differs from a floppy because it is metallic, shiny and non flexible.
5. It is large in storage capacity, More reliable, Faster access to data and information.
6. CD-ROM, CD-R, CD-RW, LS-120, Super disk, DVD, optical card, optical tape.

Review questions 2

1. What are the advantages of a digital versatile disk over a typical compact disk.
2. Define the term multimedia and list down the components required to make a computer multimedia.
3. Why are CD-ROMs and CD-Rs referred to as WORM?
4. Describe the difference between magnetic and optical storage media.
5. *Jets publishers* is a company that specializes in production of newspapers. One of the editors wanted to transfer a 50MB document from the hard disk of one computer to another using a removable storage media. Give four examples of the devices he/she could use.
6. Describe three precautions you would take to avoid damaging the hard disk.

Answer of review questions 2

1. DVD has larger storage capacity than CD, Offers better data storage quality.
2. Multimedia is an integration of sound, video and text processing and output.
Components – optical drive, speakers, sound adapter, VGA monitor.
3. Write Once Read Many (WORM) – recorded once but can be accessed many times without changing content.
4. Magnetic – data recorded using magnetism.
optical – data recorded using a beam of light (laser).
5. Jaz, Zip, Flash disk, CD-R, CD-RW.
6. Do not drop the disk drive, Do not expose it to strong heat, Do not expose it to dust/smoke particles, Do not unprocedurally switch off the computer.

Practical activity 1

- Using a floppy disk provided by the teacher:
 1. Draw and label all the parts of a diskette
 2. Remove the protective plastic casing to expose the disk platter.
 - a. How flexible is the platter?
 - b. What is the texture and colour of the surface? Is it possible to see the tracks and sectors?
 - c. Assuming the tracks and sectors are visible, draw a diagram to illustrate how they would look like.

Chapter 5

Power and interface cable

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Port

- It's a socket on the system unit into which a cable from an external peripheral device (e.g. mouse keyboard etc) is plugged to facilitate transfer of information between the device and CPU.
 - Power cable
 - Serial cables and ports
 - Parallel cables and ports
 - Universal Serial Bus (USB) cables and ports
 - Interface cable
 - Small Computer System Interface (SCSI)

Power cable

Power supply



- They are used to supply power to the motherboard and other internal devices of a computer.

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Serial cables and ports



- They transmit data between devices and CPU one bit after another. They are slow but are reliable than parallel cables. Mainly used to connect mouse.

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Parallel cables and ports



- They transmit information simultaneously using a set of many conductors. They are faster than serial. Used to connect devices such as printer.

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Universal Serial Bus (USB) cables and ports



- They transmit only 1 bit of information at a time at a very high speed than parallel. Provides quality data transmission over long distance. It's port support devices like digital cameras, scanners, mouse etc.

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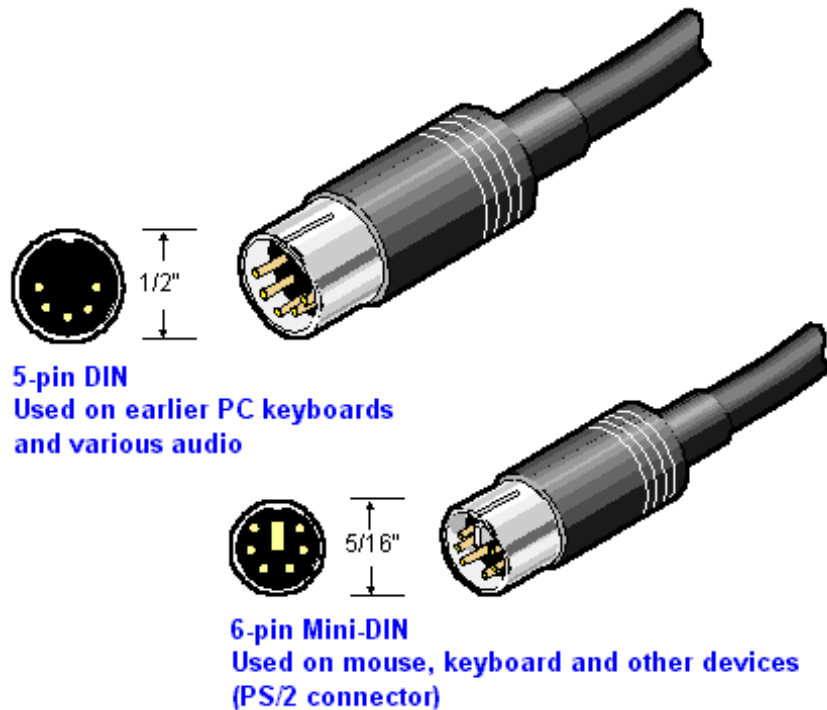
Interface cable /

Small Computer System Interface (SCSI)

- Interface cable – All peripheral devices that make up a computer system are connected to the motherboard inside the system unit through the interface cables.
- Small Computer System Interface (SCSI) – they transmit data in parallel but are faster than parallel cables. It's port allows connection of up to 7 peripheral devices.

Personal system 2 (PS/2) interface

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- Originally, most computers used the 5-pin DIN to connect a keyboard to the system unit but the smaller 6-pin mini-DIN also known as PS/2 interface has replaced this technology.

Types of ports 1

- Infra-red – used for wireless communication between the CPU and device which is infrared – capable. Communication is over short distance, and there should be no obstruction between the two devices.
- D-type ports – these ports have the shape of capital letter D. They are two types namely the Nine-Pin (DB-9) and 25 pin-wide (DB-25). The DB9 is a serial port into which cables such as mouse, modem, serial printer etc can be plugged. The DB-25 port can be used for both serial and parallel devices. When used to connect serial it's labelled COM1 or COM2 and only 10 of its pins are used. For parallel it's labeled LPT 1 or LPT 2.
- Centronic ports – this is a parallel port that uses metal clips mounted into cells in place of pins.
- Audio ports – used for inputting and outputting sound into and out of sound card.
- LAN ports – used for connecting the computer to local are network.
- Modem port – used for plugging an external modem into the computer.

Types of ports 2 (Video port)

9-pin video port

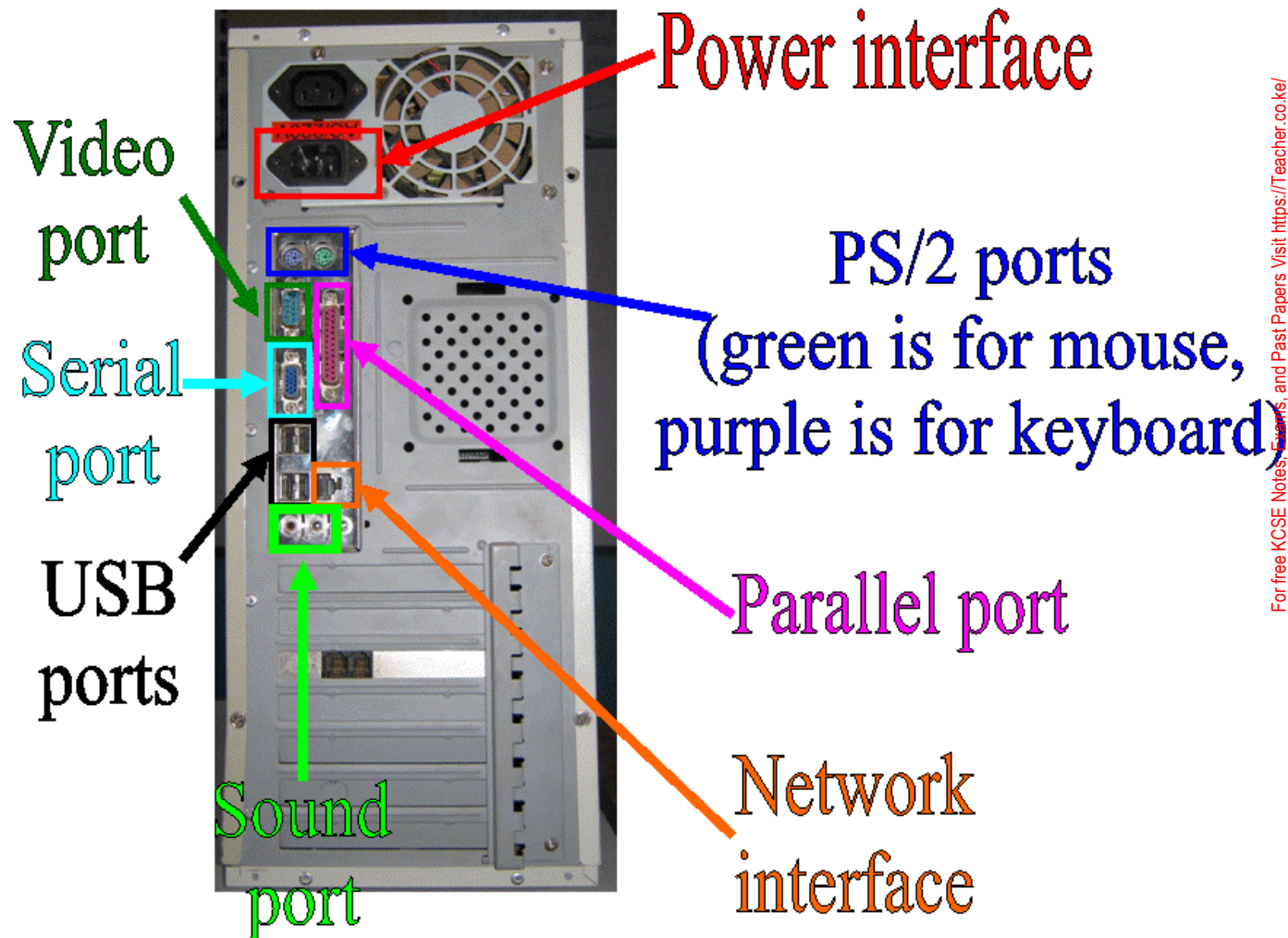


15-pin video port

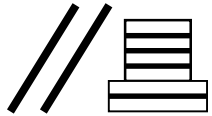







- Video ports – used for connecting the monitor to the system unit. It can be 9-pin D or 15-pin D.

Ports on the backside of system unit



Standard symbols used to denote an interface

Symbol	Port
	Parallel
	Serial
	USB
	SCSI
	PS/2 for mouse
	PS/2 for keyboard

Basic computer set-up and cabling

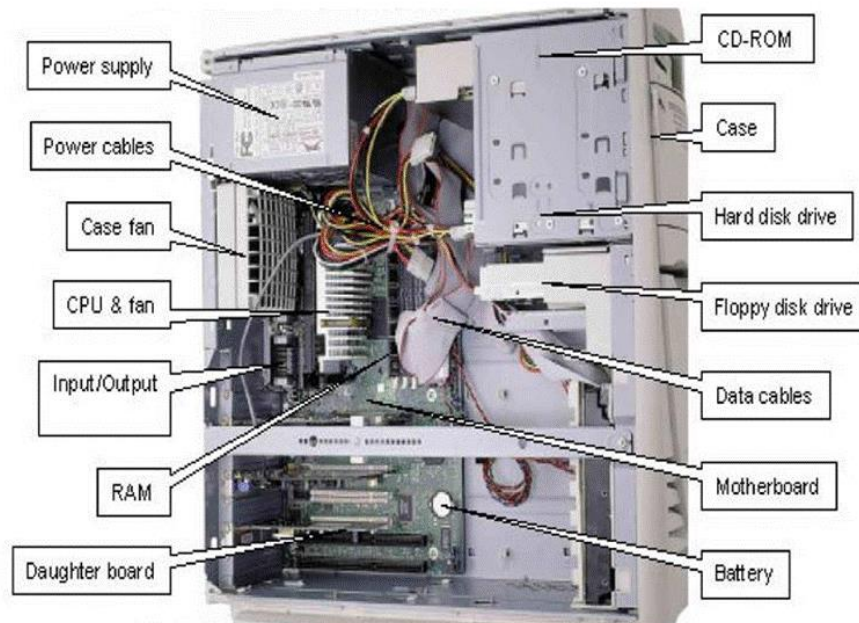
- Having learnt about various devices and how they function, it is important to familiarise ourselves on how to set up a computer.
- Before carrying out the practical the following should be observed.
 - Dismember all cables from the source of power to prevent electrical shock.
 - Follow the teacher's instructions strictly.

Tools and materials required

- Screw drivers
- Pliers
- Motherboard
- Manufacturers manual
- Required peripheral devices
- Dismantled system unit
- Power and interface cables

Steps of computer set-up and cabling 1

Inside the system unit



1. Connecting basic computer components.
2. Connecting devices to motherboard – identifying connecting points on the motherboard. Carefully identify the points on the motherboard before you start connecting the computer ports.

Steps of computer set-up and cabling 2

3. Connecting the hard disk, floppy drive, CD-ROM
 - a. Wear antistatic material to discharge any static charge on the body.
 - b. Check for a free drive bay to hold disk drive.
 - c. Slide the disk into its bay and screw it.
 - d. Connect the power supply cable to the device.
 - e. Connect the cable both to the drive then to motherboard.
 - f. If installation is complete replace the system unit cover.

Steps of computer set-up and cabling 3

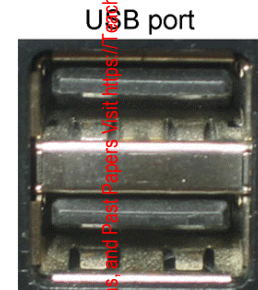
4. Connecting other peripheral devices.
 - a. Identify its port and data cable or interface cable.
 - b. Connect the data cables of all devices to their respective ports.
 - c. Switch on the computer power source.
 - d. Successful boot means the computer was properly setup.

Review questions 1

1. Define the following terms:
A). Port B). Interface cable C). Power cable
2. What is the function of the power supply unit found in the system unit.
3. Differentiate between parallel and serial interface cables.
4. Give two advantages of a USB interface cable.
5. Draw an illustration of:
A). Parallel cable B). USB port
6. What would happen if you bend the pins of a monitor port as you try to connect the monitor interface cable to the system unit?
7. Draw illustrations of various ports found at the back of the system unit of the computer.

Answer of review questions 1

1. A). Special socket for connecting peripheral devices on the system unit.
B). Cable for data transmission.
C). Cable for power supply to devices.
2. To supply stable power to system unit internal devices and the mother board.
3. Parallel cables transmits several bits simultaneously while serial transmits one bit at a time.
4. It is light, Offers fast transmission, Its serial nature enable it to connect devices a longer distance away, The USB port can be used to connect different peripheral devices due to its common universal interface.
6. No display or some colours will fail to display.



Review questions 2

1. What are the safety precautions to be observed before one starts installing devices in the system unit?
2. In relation to cabling, give two reasons why a printer may not print work sent from the computer as expected?
3. Naliaka connected new multimedia speakers to her computer and tried to play her favorite music CD but no sound was heard. What might have been the problem?

Answer of review questions 2

- A). Disconnect all devices from power source before attempting to work on them.

B). Do not work on any peripheral device without the guidance of the teacher.

C). Never work alone because you may need help in case of an emergency.

D). Discharge any static electricity that might have built up on your hands by touching an earthed metallic object and then wearing an antistatic wrist member.
- A). Loose printer interface cable.

B). Printer still off.

C). Printer not installed.
- A). Volume control too low.**

B). Loose or improper connection to the sound card.

C). Speakers not powered.

D). Multimedia not supported.

E) absence of analog cable connecting the optical drive to the motherboard or sound card.

Revision questions

- Write the following abbreviations in full:
A). CPU B). ALU C). CU
D). ROM E). RAM
- Give examples of special purpose memories found in the CPU.
- What do the following abbreviations in relation to storage capacity stand for:
A). KB B). MB C). GB
- Describe various display video cards used in computers.
- Differentiate between MICR and OCR scanners.
- What is the market name given to the most recent types of processors?
- Explain the internal mechanism of the hard disk in reference to disk platters and the read/write head.
- Describe the structure of a hard disk in reference to cylinders, tracks and sectors.
- What are pixels? What role do they play in screen display?
- Explain the steps you would follow to set up a new computer.

Answer of revision questions 1

1. A). Central Processing Unit.
B). Arithmetic Logic Unit.
C). Control Unit.
D). Read Only Memory.
E). Random Access Memory.
2. Cache and registers.
3. A). Kilobyte.
B). Megabyte
C). Gigabyte.
4. MDA, HGA, EGA, VGA and SVGA.
4. MICR uses magnetic technology to read magnetic characters while OCR uses laser technology to read characters.
5. Pentium processors.
6. The drive is made up of several disk platters that are mounted on a common axis with read/write heads on both sides of the platters. The heads move in and out as they write/read data. The outer case is hard and metallic.







Answer of revision questions 2

8. The hard disk is divided into concentric circles called *tracks*. Parallel tracks on several platters are called *cylinders*. The tracks are further subdivided into *sectors*. Several sectors can be grouped to form clusters.
9. **Pixels (picture elements) are dots on the screen that form characters and images. They determine the clarity of the image.**
10. (a). Gently and carefully connect the interface cable of each device to the correct port and to the device.
(b). Connect the computer to the power source and switch it on.
(c). Observe boot up information on the screen to see whether Power On-Self Test (**POST**) displays any error message. A successful boot means that the computer was properly setup.

Practical activity 1

- Using the universal symbols in table right, identify each port located on the system unit.

Standard symbols used to denote an interface

Symbol	Port
	Parallel
	Serial
	USB
	SCSI
	PS/2 for mouse
	PS/2 for keyboard

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Chapter 6

Computer software

Introduction

- Software are programs or set of instructions that enables a computer system to operate.

Classification of software 1

- According to purpose.
 - System software – it enables the user to communicate with the computer and its various devices e.g. keyboard.
 - Application software – application software are designed to help the user accomplish specific tasks.

Classification of software 2

- According to method of acquisition.
 - In-house developed program (Bespoke) – these programs are designed to serve a particular purpose for specific groups or people e.g. in banks for managing their operations, airlines for booking etc.
 - Standard software (off the shelf packages) – these programs are developed by software engineers, packaged and made available for purchase through a vendor or directly from developer e.g. Microsoft office.

Program under system software 1

- Firmware – it's a combination of both hardware and software. It's in form of a chip which may be used to store programs.
- Network software – it's used to establish communication between two or more computers by linking them using a communication channel e.g. cables to create network, novel, Linux etc.

Program under system software 2

- Operating system – it's a set of programs that control and supervise the hardware resources of a computer during processing. Examples of operating system include Windows 95/98/2000/XP, Linux Macintosh, MS-DOS etc.
- Utility software – they are programs that perform commonly used services that make certain aspects of computing to go on more smoothly.

Types of utility software

- System level
- Application utility
- Program translator
- Setting editor
- Text editor
- Sort editor
- Etc.
- Calculator
- Time
- Backup utility
- Anti virus utility
- Diagnostic utility
- Calendar utility

Examples of application software

- Word processor – for typing documents e.g. MS-Word.
- Database – for keeping records and files e.g. MS-Excel.
- Spreadsheet – for calculations e.g. MS-Access.
- Desk top publishing – designing publications e.g. cards (Adobe PageMaker).
- Computer Aided Design – for technical drawing e.g. AutoCAD.
- Graphics software – for designing and manipulating graphics e.g. Photoshop

Advantages of standard software over in house software

- They can easily be installed and run
- Thoroughly test hence few errors
- Readily available
- Easily modified to meet specific user needs
- Less expensive

Disadvantages of standard software over in-house software

- May not meet special needs.
- They are not as efficient as user made programs.
- When changes occur extra costs is usually needed from user.
- Not all packages are compatible with all computer system.

Criteria for selecting computer system (Specification)

- Hardware considerations
 - Processor speed
 - Computer memory capacity
 - Upgrading and compatibility
 - User needs
 - Cost
 - Portability
 - Warranty

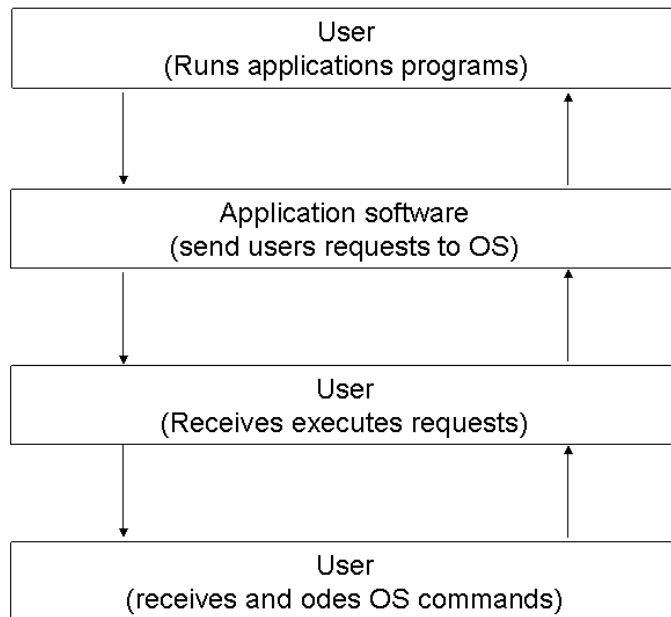
Criteria for selecting computer system (Specification)

■ Software considerations

- User needs
- Documentation
- Authenticity
- User friendliness
- Cost
- Portability

Operating system (OS)

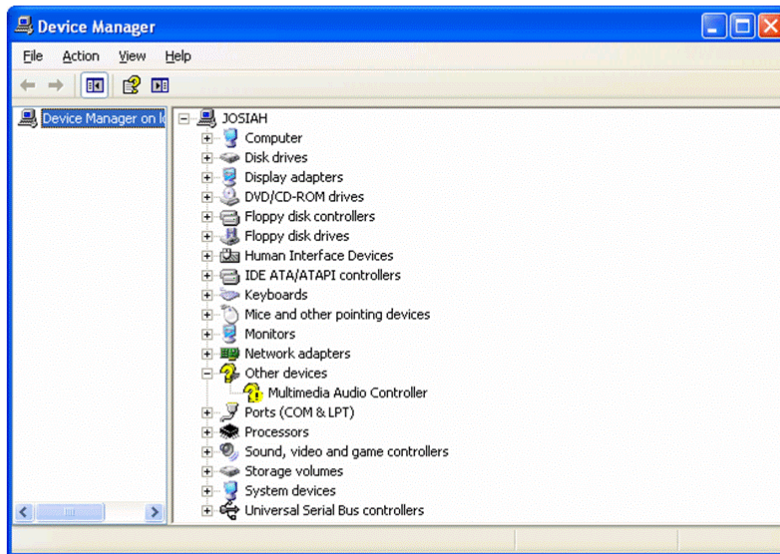
Role of an operating system



- Operating system is a set of programs that control and supervise the hardware resources of a computer and provide services to other system software. Examples of operating system includes; Microsoft Windows 95/98/2000/XP/Vista, Unix, Linux, MS-DOS, novel etc.

Functions of operating system (OS) 1

Resource allocation



- Resource control – the OS allocates computer resources such as CPU time, main memory, secondary storage and input/output for use by application program.

Functions of operating system (OS) 2

- Job scheduling – the OS prepares, schedules, controls and monitors tasks submitted for execution to ensure the most efficient processing.
- Memory management – the OS ensures that each program and the data it requires are allocated adequate space in memory.

Functions of operating system (OS) 3

- Error handling – OS provides the error correction routines to ensure smooth operations within CPU.
- **Interrupt handling – OS determines the cause of the interrupt and transfer the control to the most appropriate programs.**
- Input/output handling – the OS governs input/output of data and their location, storage and retrieval.

Functions of operating system (OS) 4

- Communication control and management – the operating system is responsible for managing various communication devices and provide an environment within which communication protocol operate. The term protocol refers to the rules that governs system come with network management utilities that provide external communication by connecting to a communication systems using interface cable or through wireless interface.

Types of operating system

- Operating system can be classified according to;
 - Number of users
 - Number of tasks
 - Interface

Number of users

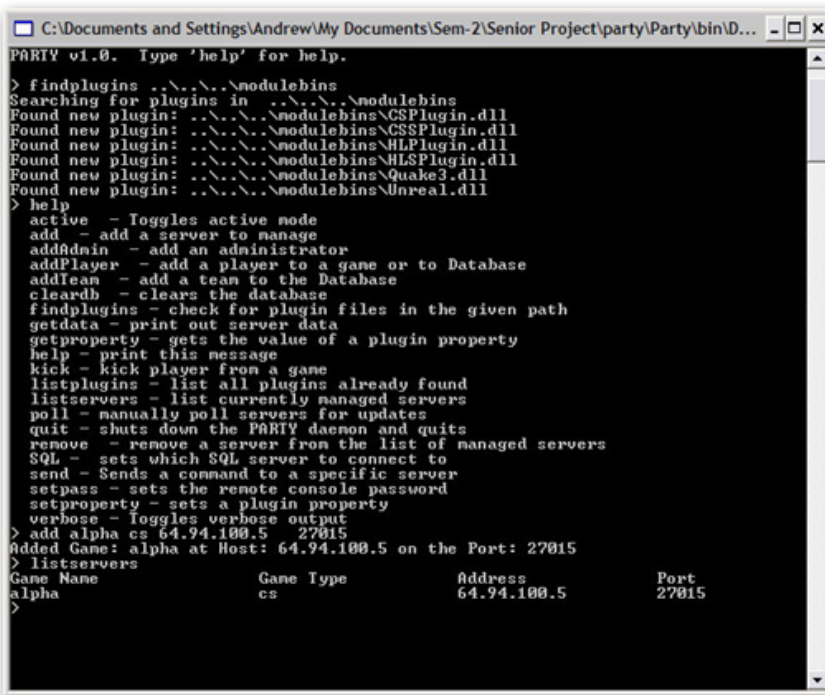
- Single user-operating system – this OS allows only one user at a time to access a computer e.g. MS-DOS, MS-Windows 95/98/2000.
- Multi-user operating system – this OS allows two or more users to access a computer at the same time e.g. Windows 2000 server, Novel, Unix, Windows NT etc.

Number of tasks

- Single tasking operating system – this OS allows only one program to be executed at a time e.g. MS-DOS.
- Multi-tasking operating system (multithreading) – this OS allows a single CPU to execute more than one program at a time e.g. Windows Vista, XP etc.

Interface (Command line)

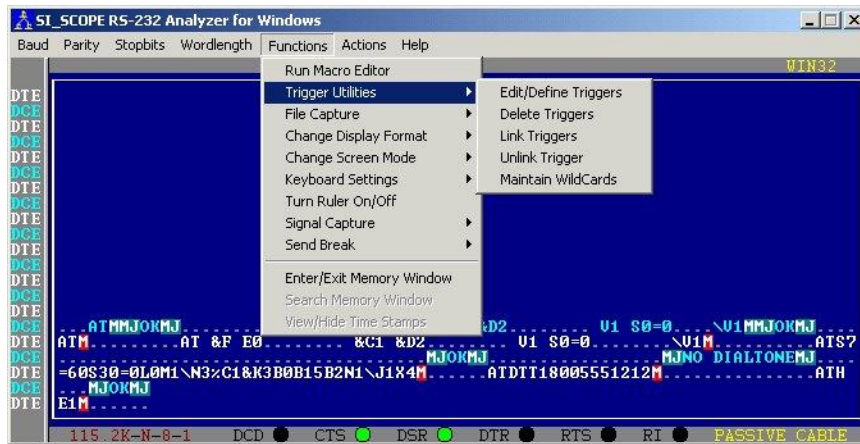
- Command line – the user interacts with a computer by typing a command at the prompt found on a command line e.g. MS-DOS.



```
PARRY v1.0. Type 'help' for help.
> findplugins ..\..\..\modulebins
Searching for plugins in ..\..\..\modulebins
Found new plugin: ..\..\..\modulebins\CSSPlugin.dll
Found new plugin: ..\..\..\modulebins\CSSPlugin.dll
Found new plugin: ..\..\..\modulebins\HLSPPlugin.dll
Found new plugin: ..\..\..\modulebins\HLSPPlugin.dll
Found new plugin: ..\..\..\modulebins\Quake3.dll
Found new plugin: ..\..\..\modulebins\Unreal.dll
> help
  active - Toggles active mode
  add - add a server to manage
  addAdmin - add an administrator
  addPlayer - add a player to a game or to Database
  addTeam - add a team to the Database
  cleardb - clears the database
  findplugins - check for plugin files in the given path
  getdata - print out server data
  getproperty - gets the value of a plugin property
  help - print this message
  kick - kick player from a game
  listplugins - list all plugins already found
  listservers - list currently managed servers
  poll - manually poll servers for updates
  quit - shuts down the PARRY daemon and quits
  remove - remove a server from the list of managed servers
  SQL - sets which SQL server to connect to
  send - Sends a command to a specific server
  setpass - sets the remote console password
  setproperty - sets a plugin property
  verbose - Toggles verbose output
> add alpha cs 64.94.100.5 27015
Added Game: alpha at Host: 64.94.100.5 on the Port: 27015
> listservers
Game Name      Game Type      Address         Port
alpha          cs             64.94.100.5    27015
>
```

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Interface (Menu driven interface)



- Menu driven interface – this interface allows the user to select commands/options from a list or menu using keyboard or pointing device such as mouse. E.g. MS-DOS version called DOS editor).

Interface (Graphical User Interface)



- Graphical User Interface (GUI) – this interface represents commands as small pictures on the screen called icons e.g. Microsoft Windows 95/98/2000/XP/Vista, Linux etc

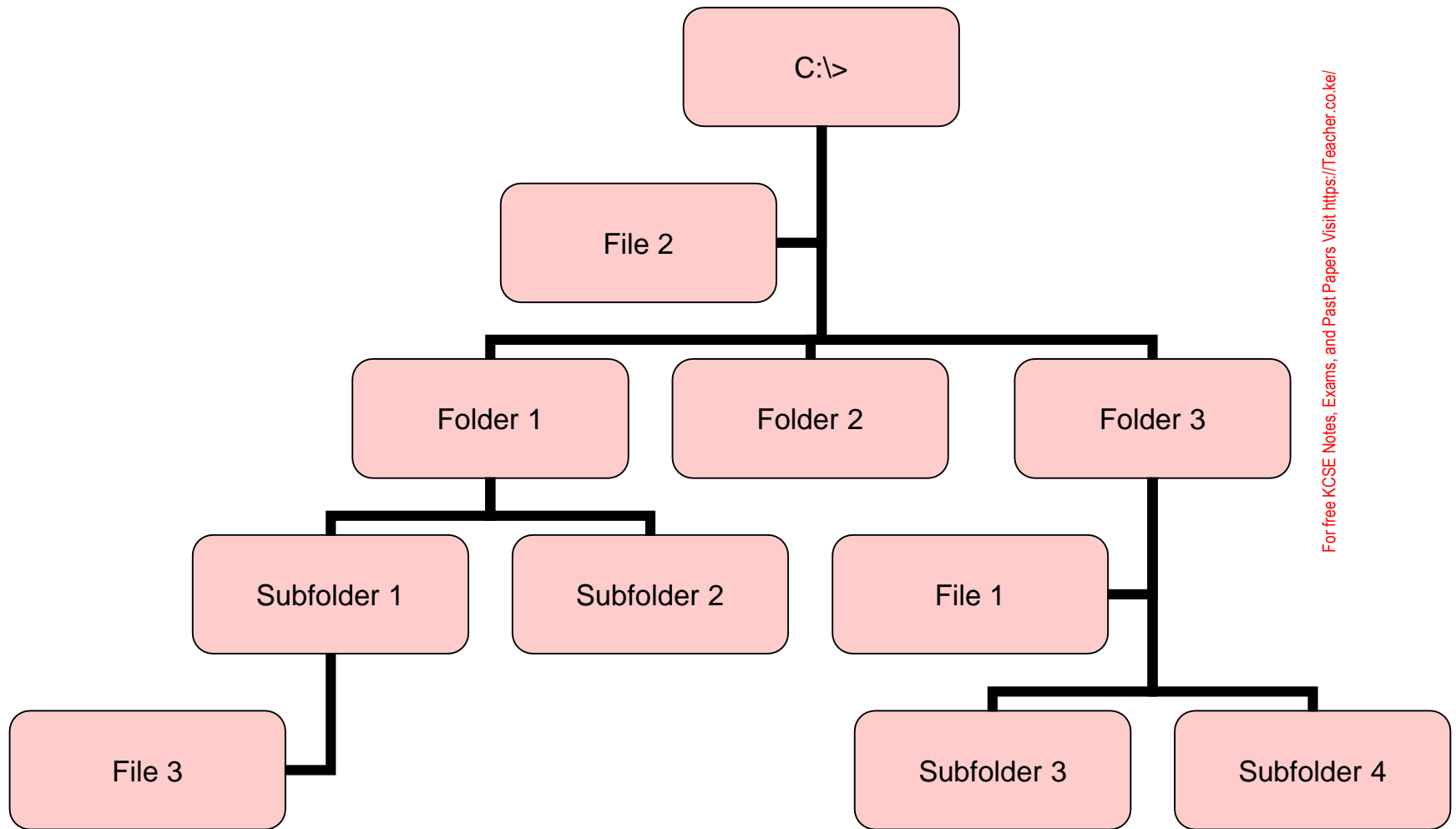
Selecting an operating system

- Factors to consider when choosing an O.S.
 - Hardware configuration
 - Basic design of the computer
 - Applications intended for the computer
 - User friendliness
 - Cost
 - Availability in market

How Windows organise information

- The OS organise information in terms of files, folders and drives.
 - File – it's a collection of related data or information stored in one location.
 - Folder/directory – it's a named storage area where the user can store related files to enable easy access.
 - Storage media – when creating a folder or saving a file identify a storage location which is more reliable e.g. floppy disk, compact disk, hard disk etc.

Information organisation tree



Types of files 1

File icon



- System files – these files contain information that is critical for the operation of the computer.
- Application files – these files hold programs or application files.

Function of files

- Storage of data.
- Organisation of information.

Folder/directory

- It's a named storage area where the user can store related files to enable easy access.

Storage media

- When creating a folder or saving a file identify a storage location which is more reliable e.g. floppy disk, compact disk, hard disk etc.

Types of files 2

Extension	File type	Description
.doc	Data	A Microsoft Word document file.
.txt	Data	A plain text created using note pad or DOS editor.
.tif	Data	A graphic file created using applications such as adobe photoshop.
.exe	Application file	The file that launches a particular application, e.g. Windows.exe, PM70.exe, etc
.bat	System files	File containing a series of commands loaded during boot up.
.sys	System files	System files that perform fundamental operations in a computer.

Drives

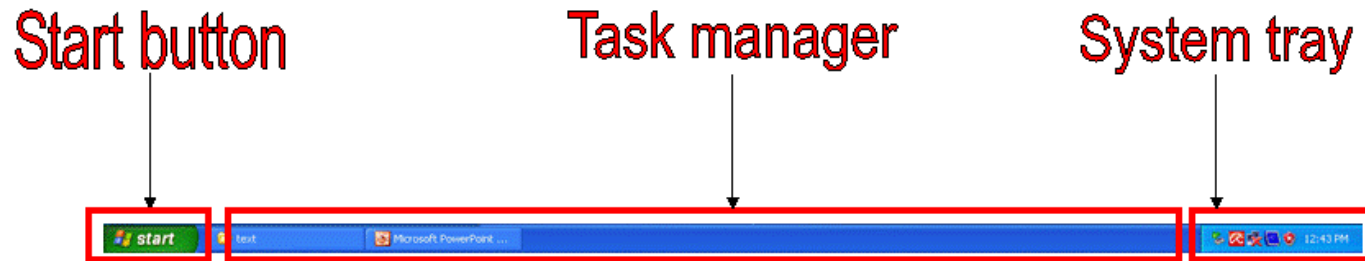
Storage location	Drive	Remarks
Floppy drive	A and B	If a computer has two floppy drives, one will be assigned letter A the other B.
Hard disk	C,D,E,F	If a computer has 4 hard drives, they will be assigned letters C-F.
Optical drives	D,E,F,G	If a computer has one hard disk and three or more CD/DVD drives, they will take up any number between D and Z.
Other removable	D,E,...Z	If a computer does not have an optical drive, any removable drive attached to the computer can take any letter between D and Z.
Network drive	Logical	Network drives take D-Z depending on the number of physical drives installed or attached.

Windows desktop feature



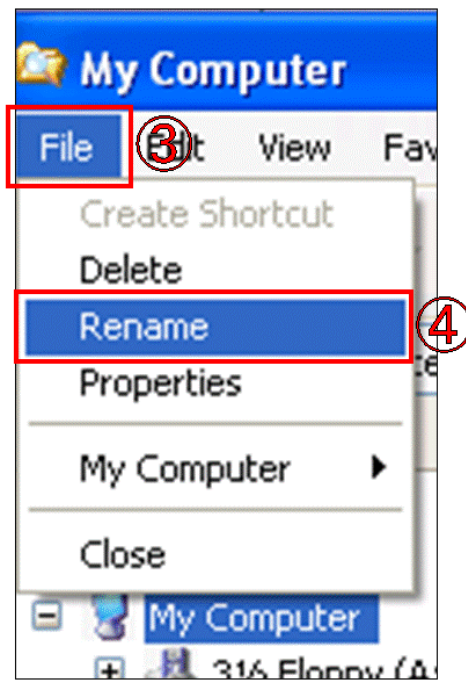
- Once you turn on the computer, Windows is loaded into the main memory and finally the desktop showing that the computer is ready for use appears. The three main features of the desktop are the background, icons and the taskbar.

Taskbar



- The taskbar enables the user to easily switch between different programs and tasks that are currently running. Whenever the user starts a program or opens a file, its button appears on the taskbar and stays there until the user exits the program.

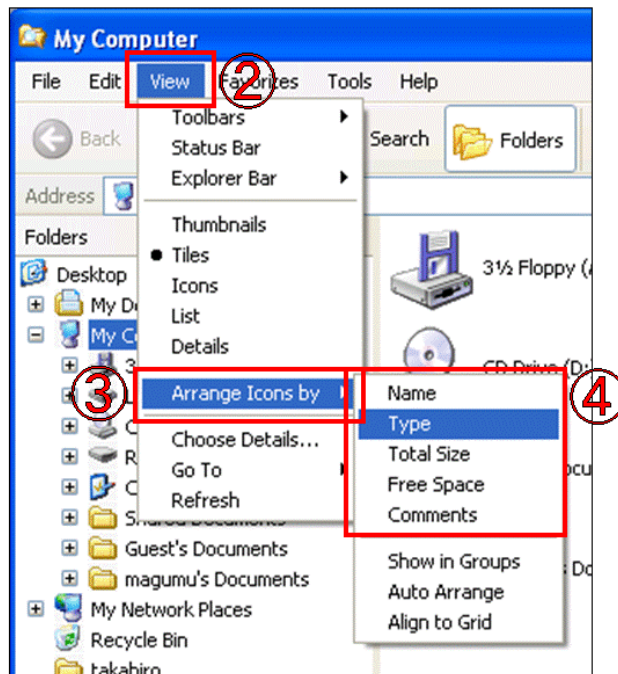
Managing files/folders (Renaming)



- Refers to changing files from their original name to some other new names.
1. Using My Computer con, display the Explorer window.
 2. On the folder tree on the left pane, select the file or folder to be renamed.
 3. On the “File” menu.
 4. Click the “Rename”.
 5. Type the new name.
 6. Type the “Enter” key.

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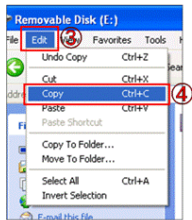
Managing files/folders (Sorting)



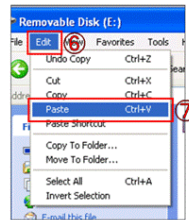
- Refers to organising files and folders in a particular way.
1. Open a folder or storage location.
 2. On the “View” menu.
 3. Point to “Arrange Icon By”.
 4. Select one from list. “Name”, “Size”, “Type” or “Modified”.

Managing files/folders (Copying)

Copy

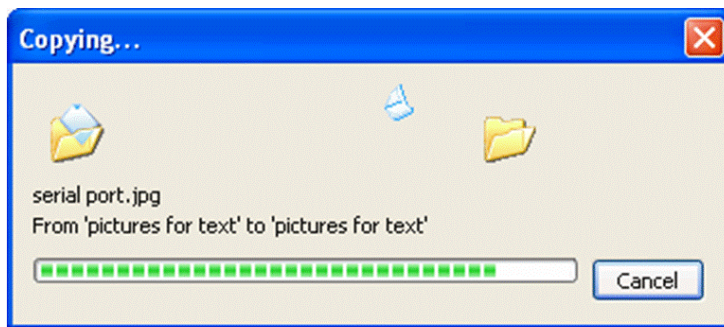


Paste



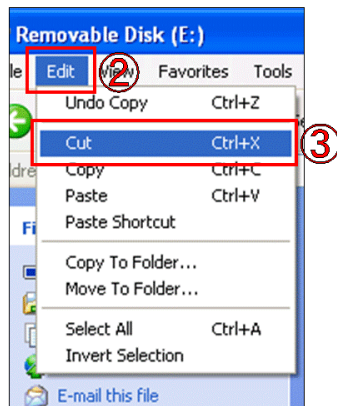
- Enables the computer user to duplicate files and folders to another location.

1. Using My Computer icon, display the Explorer window.
2. Select the file or folder to be copied.
3. On the “Edit” menu.
4. Click the “Copy”.
5. Select the drive or folder where you want the item to be copied.
6. On the “Edit” menu.
7. Click the “Paste”.

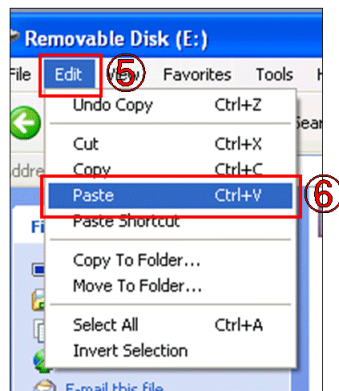


Managing files/folders (Moving)

Cut

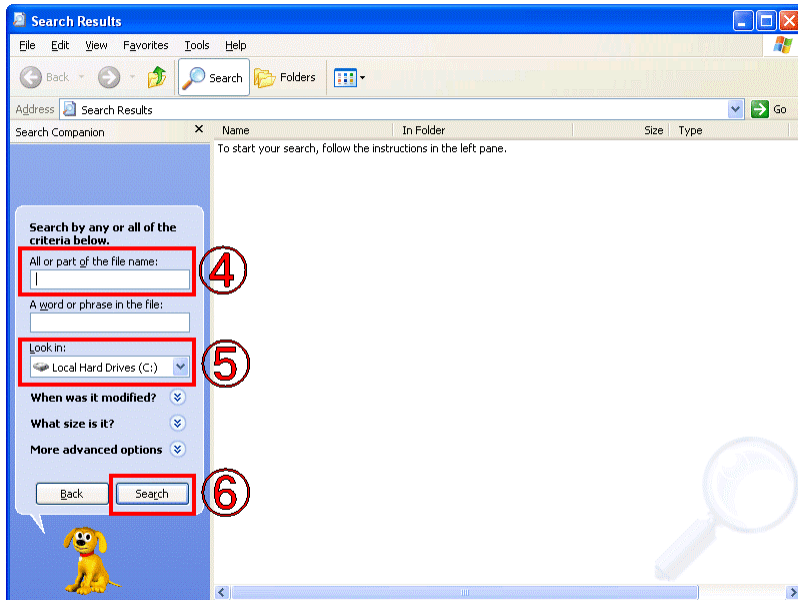


Paste



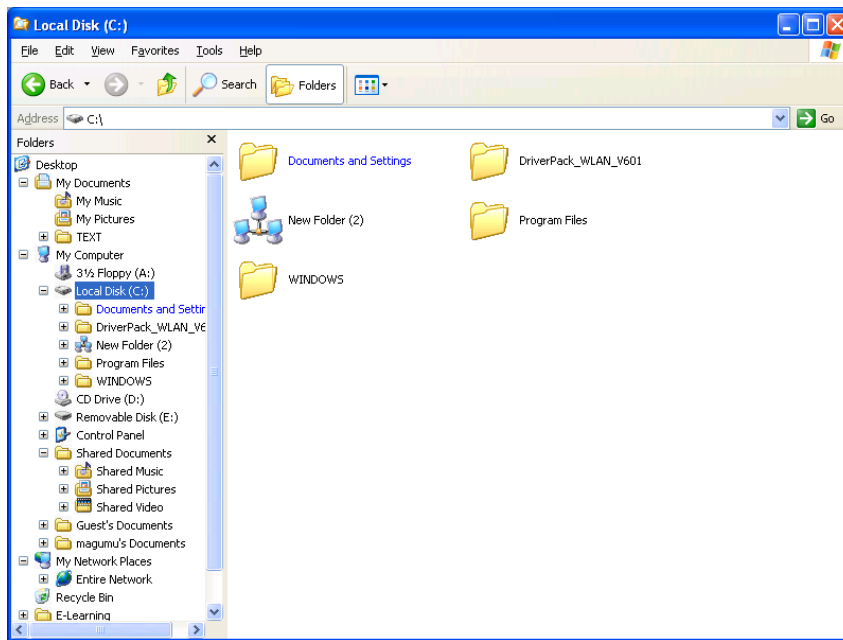
- Refers to removing the files and folders completely from the storage location.
1. Using My Computer icon, display the Explorer window.
 2. On the “Edit” menu.
 3. Click the “Cut”
 4. Select the drive or folder where you want the item moved.
 5. On the “Edit” menu.
 6. Click the “Paste”

Managing files/folders (Searching)



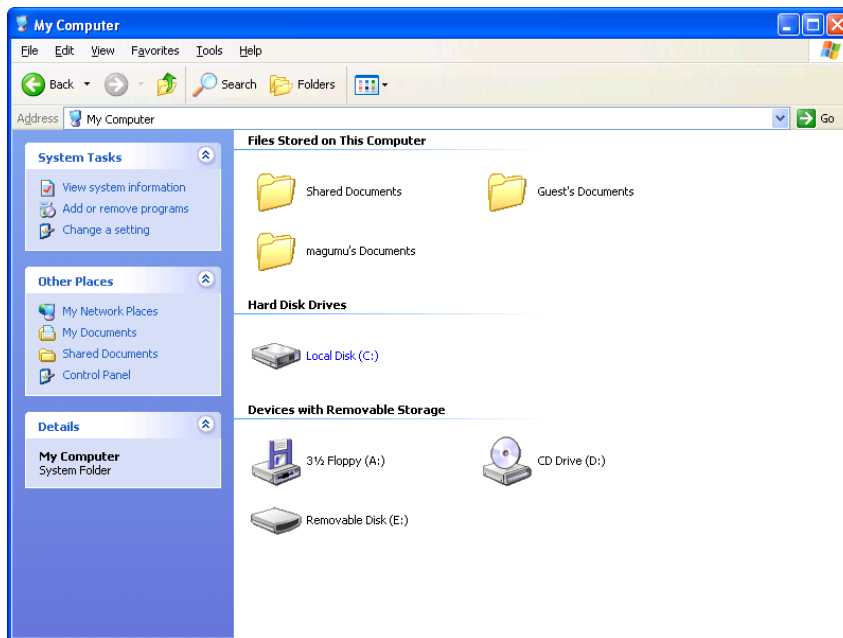
- Refers to looking for a certain file or folder.
1. Click the “Start” button.
 2. Point to “Search” (Search dialog box is displayed).
 3. Click the “For Files or Folders”.
 4. Type all or part of the file name in the search box.
 5. Select location of the file from arrow down list.
 6. Click the “Search” button.

Windows explorer



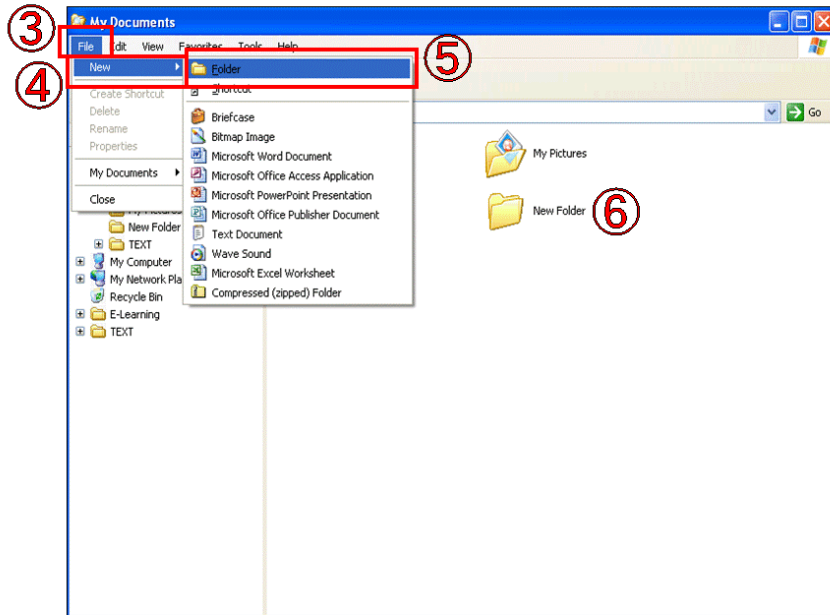
- Windows explorer lets the user display the drives and folders in a hierarchy or tree structure. The computer tree is an upside down structure with the highest level in this case the desktop being the root. The explorer divides the window into two panes. The left pane displays a tree of drives and folders while the right pane displays a list of files and subfolders contained in a particular open drive or folder.

Using My Computer



- Double clicking on MY Computer icon, gives you a graphical view of what is inside the computer. This includes the drives, the control panels and other resources.

Creating a new folder



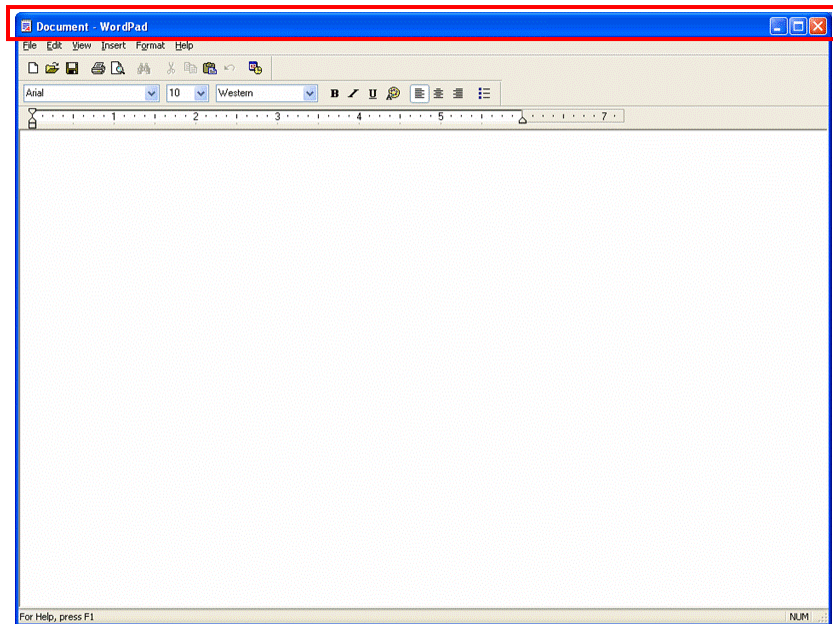
- There will be times when the user would want to create new folders. Say, for instance, when working on a detailed project that has multiple files. It is advisable that all related files be kept together in one folder.

1. Open the “My Computer” and display the Explorer window.
2. On the folder tree on the left pane, select the location in which you want to create a new folder.
3. On the “File” menu.
4. Point to “New”.
5. Click the “Folder”. (New folder is displayed)
6. Type a new name for the folder.

The application window

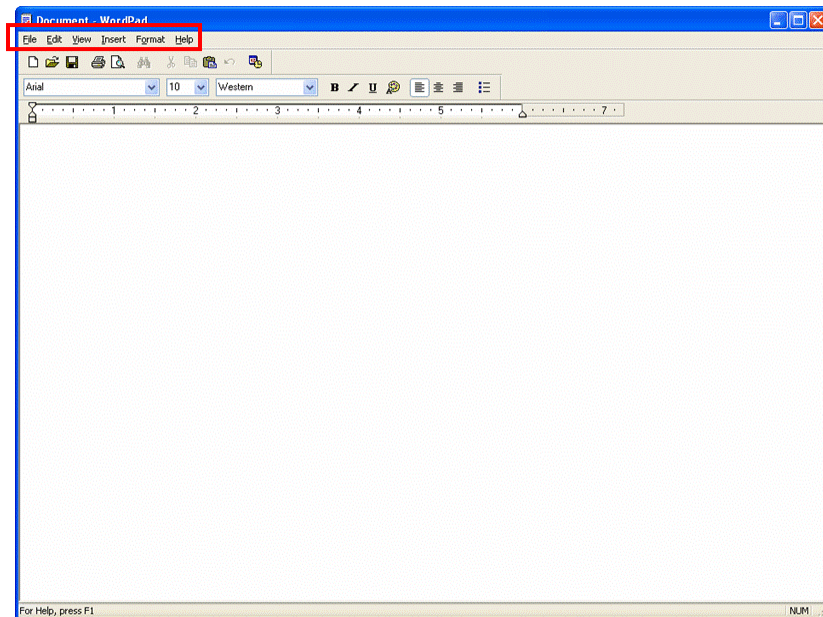
- To enter data in a new file created, one has to open it in its application programs. This is done by double clicking the file icon. A rectangular area called an application window appears on the screen.

Parts of a window (Title bar)



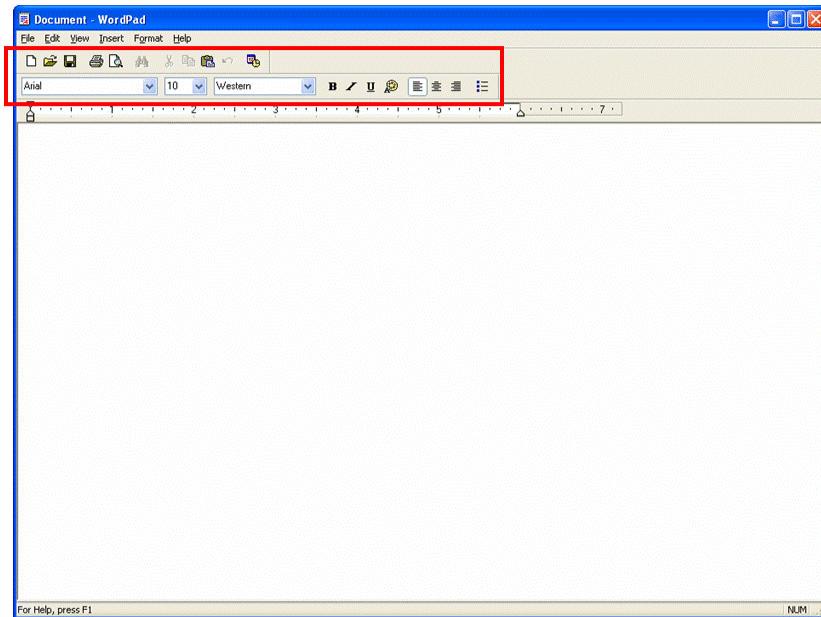
- This is a bar across the top of the window that displays the name of the current application programs.

Parts of a window (Menu bar)



- Provides a list of commands that can be used to manipulate a task.

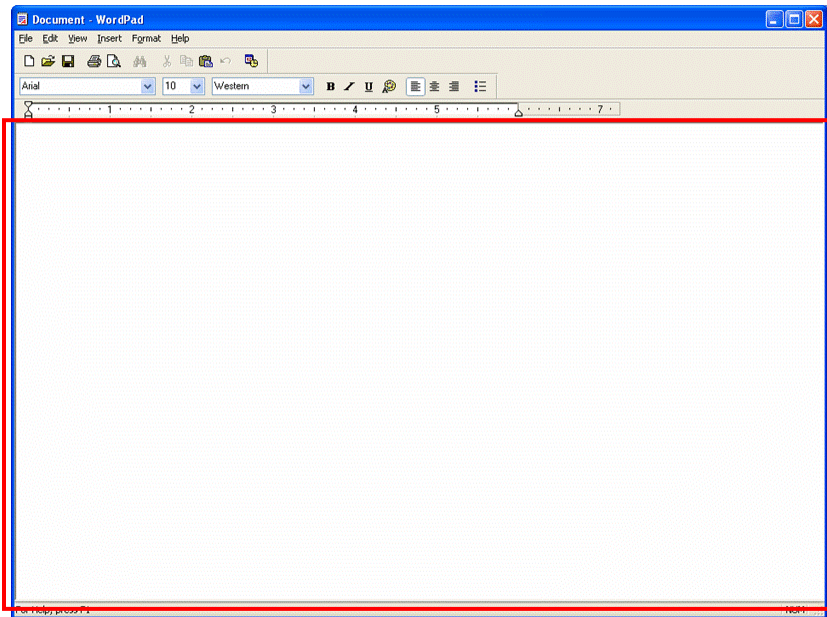
Parts of a window (Tool bar)



- They are buttons arranged in a row that are shortcuts to menu commands.

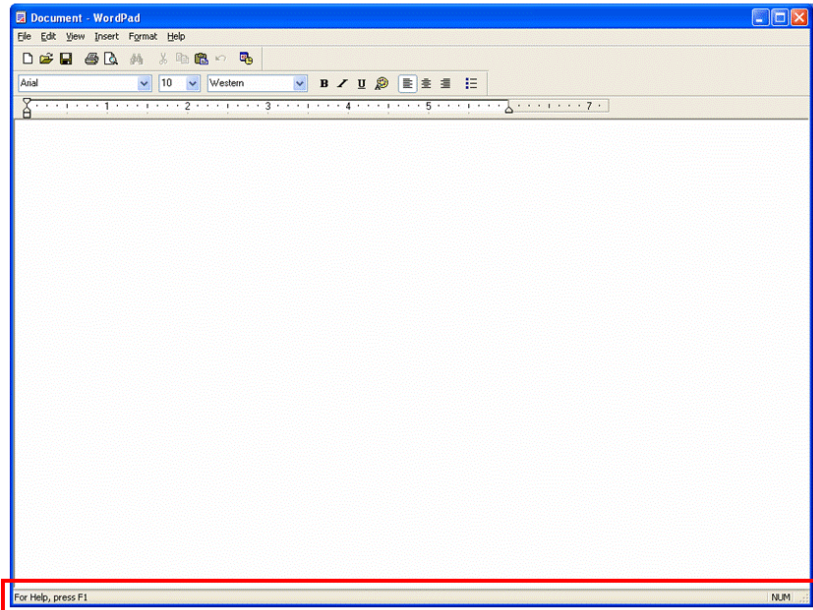
Parts of a window (Work area)

- This is the area where you can create your document.



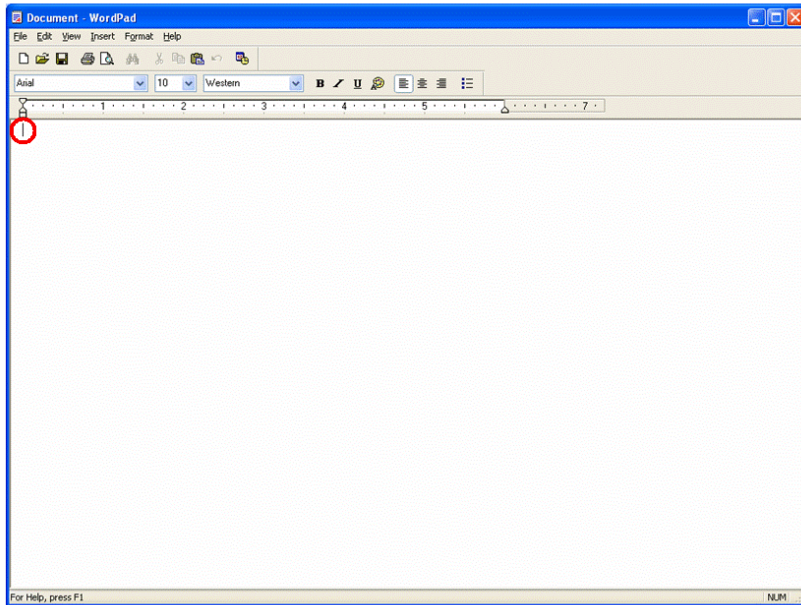
Parts of a window (Status bar)

- This displays information about the program currently running.



Parts of a window

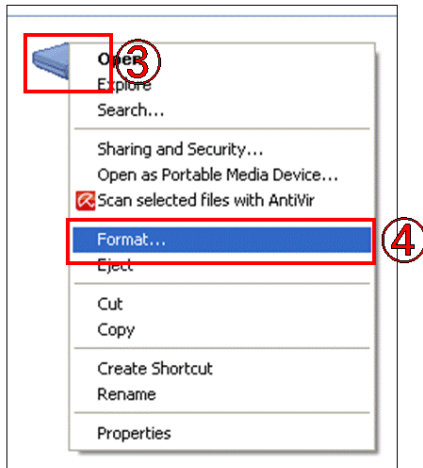
(Insertion point/Text cursor)



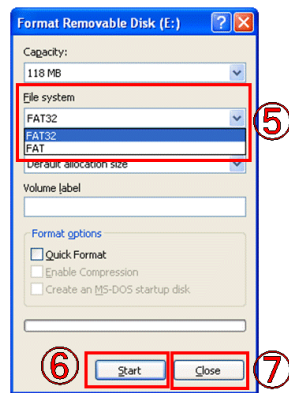
- Marks the place where text and graphics will appear when typing drawing is started.

Disk management using operating system (Formatting disk)

Open the formatting disk dialog box



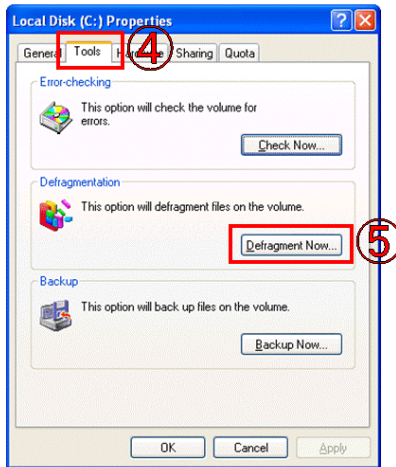
Formatting disk dialog box



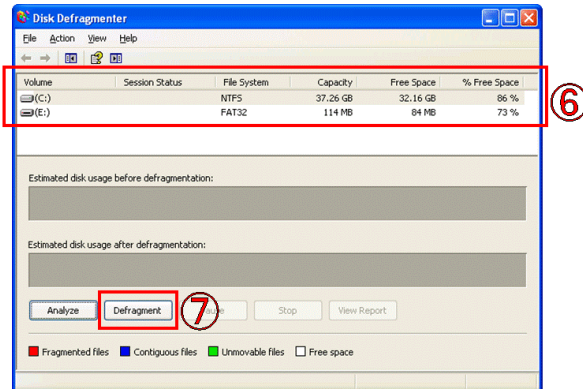
- The process of preparing a new disk for use by creating sectors and tracks on the surface of disk.
1. Insert the media disk into the floppy or USB port.
 2. Open the “My Computer”
 3. Right click on the drive icon. (Shortcut menu is displayed)
 4. Click the “Format”. (Format dialog box is displayed)
 5. Select the Format system from the arrow down list. “FAT”, “FAT32” or “NTFS”.
 6. Click the “Start” button.
 7. After format has finished, click the “Close” button.

Disk management using operating system (Disk defragmentation)

Properties dialog box



Disk defragmentation dialog box



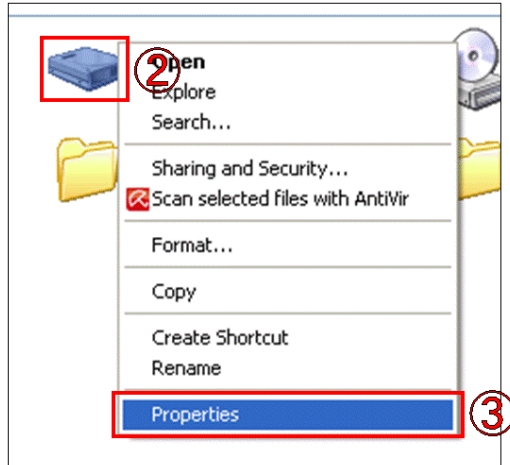
- Refers to arranging of scattered folders and files on a storage media for easy access of files and folders.

1. Open the “My Computer”
2. Right click on the drive icon. (Shortcut menu is displayed)
3. Click the “Properties”. (Properties dialog box is displayed)
4. Select the “Tool” tab.
5. Click the “Defragment Now” button. (Disk Defragmenter dialog box is displayed)
6. Select the drive to be defragment.
7. Click the “Defragment” button.

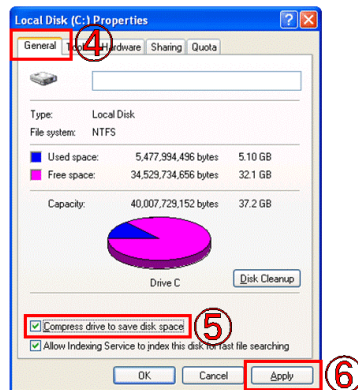
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Disk management using operating system (Disk compression)

Open the properties dialog box



Properties dialog box

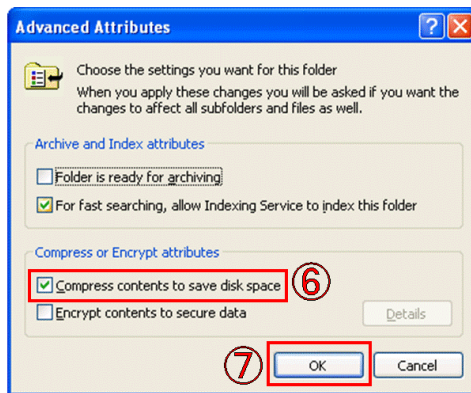


- This tool help in consolidating files and folders in smaller storage areas hence creating more space on the storage device.

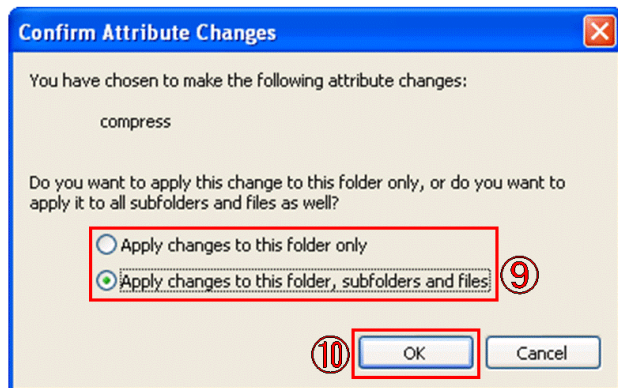
1. Open the “My Computer”
2. Right click on the drive you want to compress. (shortcut menu is displayed)
3. Click the “Properties” (Properties dialog box is displayed).
4. Select the “General” tab.
5. Click the check box of “Compress drive to save disk space”.
6. Click the “Apply” button.

Disk management using operating system (File or folder compression)

Advanced Attributes dialog box



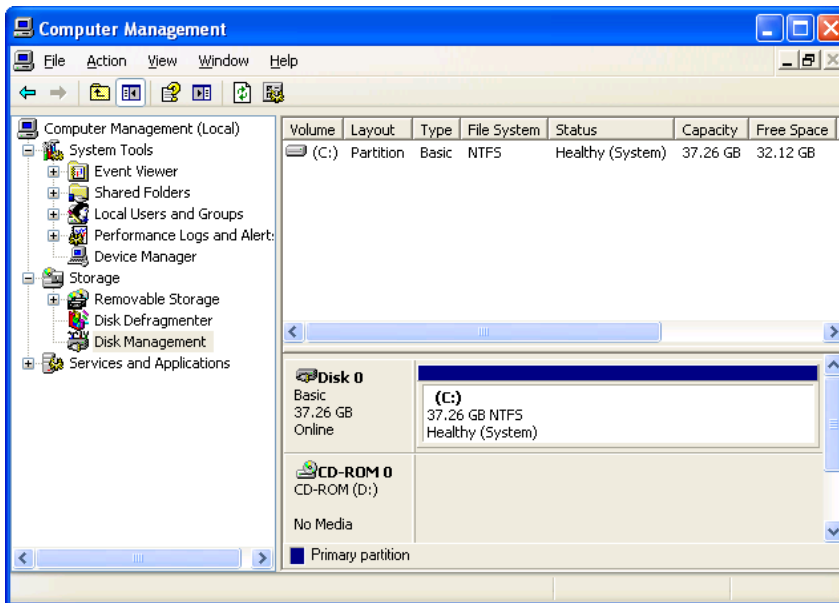
Confirm Attribute Changes dialog box



1. Open the drive where the file or folder is located.
2. Right click on the file or folder icon. (shortcut menu is displayed)
3. Click the “Properties”.
4. Select the “General” tab.
5. Click the “Advanced” button.
6. Click the check box of “Compress contents to save disk space”.
7. Click the “OK” button of “Advanced Attributes” dialog box.
8. Click the “OK” button of “Properties” dialog box. (Confirm Attribute Changes dialog box is displayed)
9. Select zip the folder only or the entire content.
10. Click the “OK” button.

Disk management using operating system (Disk partitioning)

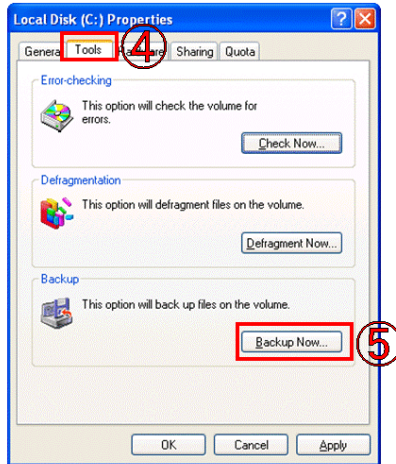
- The process of dividing the physical disk into two or more partitions called logical drives.



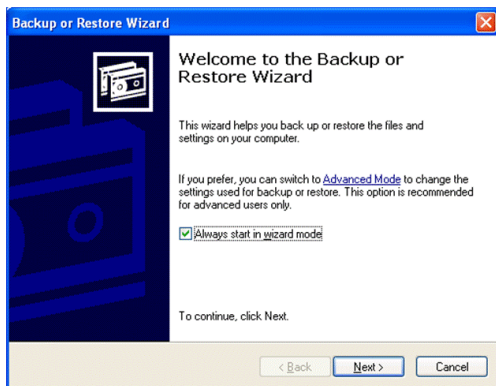
Disk management using operating system

Properties dialog box (Back up data)

Properties dialog box



Backup or Restore Wizard

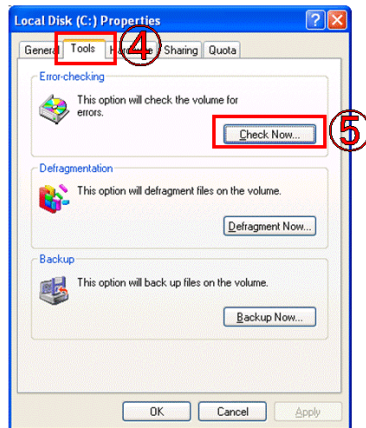


- The tool enables the user to create copies of data and programs on separate storage areas to avoid losing of data and programs incase the storage device fails.

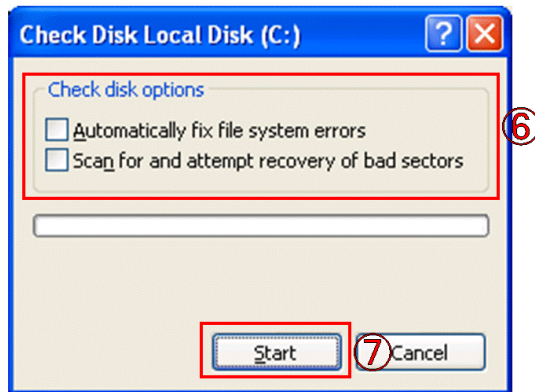
1. Open the “My Computer”.
2. Right click on the hard drive icon (shortcut menu is displayed).
3. Click the “Properties” (Properties dialog box is displayed).
4. Select the “Tool” tab.
5. Click the “Backup Now” button. (Backup or Restore Wizard dialog box is displayed).
6. Through the process step by step.

Disk management using operating system (Scanning storage device)

Properties dialog box



Check disk dialog box

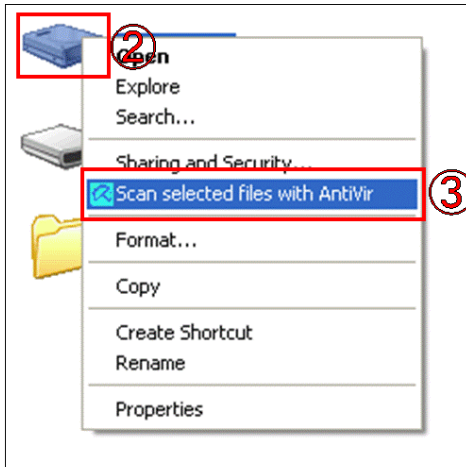


- The tool helps the user to check up and repair minor storage problems e.g. lost storage or damaged surface.
1. Open the “My Computer”
 2. Right click on the drive icon. (Shortcut menu is displayed).
 3. Click the “Properties” (Properties dialog box is displayed).
 4. Select the “Tool” tab.
 5. Click the “Check Now” button. (Check disk dialog box is displayed).
 6. Select the “Check disk options”.
 7. Click the “Start” button.

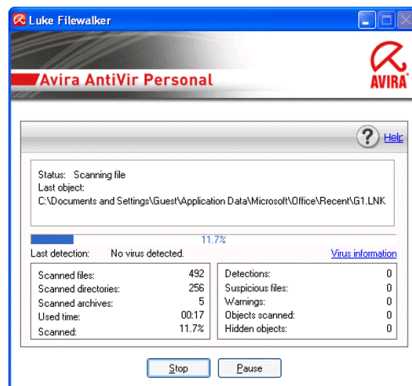
Disk management using operating system

(Scanning for virus)

Start virus scan



Anti virus dialog box



- Refers to checking your system for virus and removing them e.g. using Norton antivirus, MacAfee software to scan.

1. Open the "My Computer"
2. Right click on the hard drive icon. (shortcut menu is displayed).
3. Click the "Scan with <antivirus name>". (Anti virus dialog box is displayed).
4. The scan process in initialized.

Partitioning a disk using FAT32 file system

Fdisk menu

```
Microsoft Windows 98
Fixed Disk Setup Program
(C) Copyright Microsoft Corp. 1983 - 1998

                FDISK Options

Current Fixed disk drive: 1

Choose one of the following:

1. Create DOS partition or Logical DOS Drive
2. Set active partition
3. Delete partition or Logical DOS Drive
4. Display partition information
5. Change current fixed disk drive

Enter choice: [ 1 ]

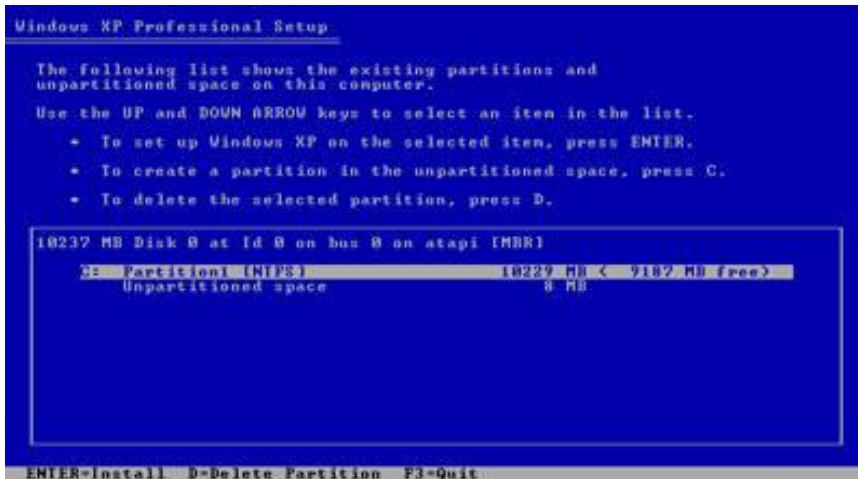
Press Esc to exit FDISK
```

- Microsoft Windows 98/Me startup disk has an FDISK utility that lets the user partition and format a disk using FAT or FAT32 file system.

NB; FAT means
File Allocation Table

Partitioning a disk during installation

- Partitioning a disk using NTFS format in Windows 2000, XP and vista is done during the installation process as shown in left figure.



The screenshot shows the Windows XP Professional Setup disk partitioning screen. The title bar reads "Windows XP Professional Setup". The main text says: "The following list shows the existing partitions and unpartitioned space on this computer. Use the UP and DOWN ARROW keys to select an item in the list." Below this, there are three instructions: "• To set up Windows XP on the selected item, press ENTER.", "• To create a partition in the unpartitioned space, press C.", and "• To delete the selected partition, press D." A table lists the disk information:

Partitions (NTFS)	10229 MB < 9182 MB free>
Unpartitioned space	8 MB

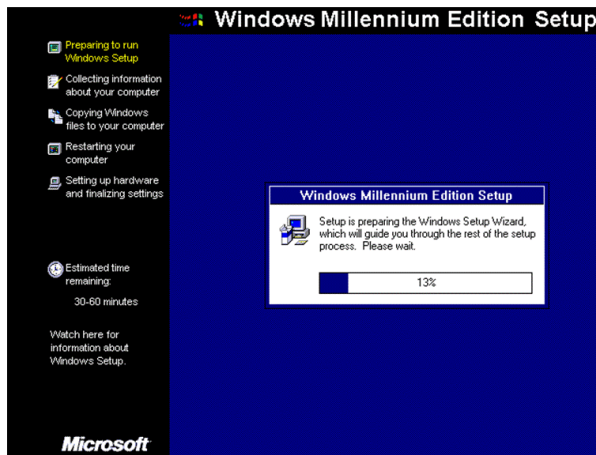
At the bottom, it says "10237 MB Disk 0 at Id 0 on bus 0 on atapi [MBR]" and "ENTER=Install D=Delete Partition F3=Quit".

NB;NTFS means

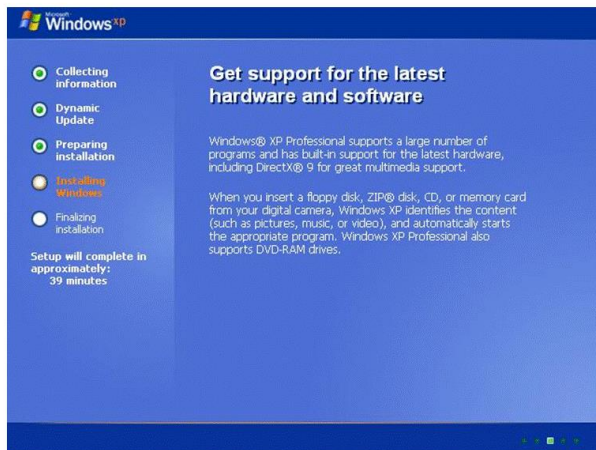
New Technology File System.

Installing Windows XP

Windows Millennium install



Windows XP install



- Installing Windows XP is quite different from that of Windows Me because it does not operate in real DOS mode. The two methods of installing XP are upgrading from a previous Windows version is relatively simple, we shall look at clean installation, done on a new computer that comes without a n operating system.

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Trouble shooting windows related problems

- Trouble shooting refers to the process of diagnosing and trying to fix hardware or software related problems.

Some problems windows experience

- Failure to boot
- Computer hangs now and then
- Abnormal restarting

The problems may be as a result of

- There was a problem in the installation process e.g. missing files.
- **Insufficient system memory.**
- Problem with hard disk boot sector may be due to virus infection.
- **Corrupted window registry system.**
- Due to interrupt conflicts.

To troubleshoot you need to

- Study the trouble shooting guide
- Use the device manager to check the devices causing problems.
- Reinstall the operating system if the problems above persist.

Review questions 1

1. Differentiate between system software and application software giving an example of each.
2. What is the importance of an operating system?
3. Give five examples of application software and their respective uses.
4. What are the advantages of standard software over the in-house developed software?
5. What is the difference between single-purpose programs and integrated software?
6. Why do computers need network software?
7. Give three examples of operating system.

Answer of review questions 1-1

1. System software performs fundamental operations like initialising hardware during boot up while application software meets user specific needs.
System software – operating system, firmware, utilities.
Application software – word processor, spreadsheets etc.
2. **Supervises all the hardware and software operations of the computer system.**
3. Word processor – typing documents.
Spreadsheets – calculations.
Database management systems – record management.
Desktop publishing – creating publications.
Graphics software – creating and manipulating.

Answer of review questions 1-2

4. Standard software is thoroughly tested hence few errors, Readily available, Easily portable.
5. Single purpose software is developed for only one purpose while integrated software is a suit of more than one programs and can be used to carry out a variety of tasks.
6. To enable communication between computers over a channel (media).
7. UNIX, Windows, DOS, LINUX, Macintosh Operating system.

Review questions 2

1. Highlight hardware and software factors that you would consider when purchasing a computer.
2. Why is it important to carefully study a warranty before signing it?
3. Why do you have to window shop before buy a computer or computer accessories?
4. Using newspaper cuttings such as the one shown below, prepare a requisition form for ten up to date multimedia computers to be used in the computer room.

Answer of review questions 2

1. Hardware

1. Cost
2. Compatibility
3. Upgradability
4. Warranty
5. Memory capacity
6. Portability
7. User needs
8. Processor type and speed

Software

1. Authenticity
2. Documentation
3. User friendliness
4. Cost
5. Compatibility
6. portability

2. In order to negotiate on sensitive items like duration, after sales service etc.
3. Yes, in order to compare quality and prices.

Review questions 3

1. Give examples of two multi-user and one single user operating system.
2. Describe four functions of the operating system.
3. What is an interrupt?
4. Name and explain three types of human computer interfaces.
5. What are the advantages of GUI based operating system over the command-line?
6. Differentiate between Multitasking and multi-user operating systems.
7. What is a deadlock in reference to the operating system?
8. Outline the factors you would consider if you were to by an operating system.

Answer of review questions 3-1

1. Multi user OS – UNIX, WindowsNT/200, Novell, Linux.
Single user – MS-Dos, PC-DOS.
2. A). Resource control and allocation.
B). Job scheduling/processing scheduling.
C). Input/output handling.
D). Memory management.
E). Interrupt handling.
F). Error handling.
G). Job sequencing.
3. A). Command line –user types commands.
B). Menu driven – user selects and option.
C). Graphical user interface – use selects commands in form of icons with a pointing device.
4. A). User friendliness.
B). Easy to learn.

Answer of review questions 3-2

6. Multitasking – can run more than one program simultaneously while multi user OS allows more than one user to make use of the CPU concurrently.
7. It is a situation in an O/S when a particular task holds a needed resource and refuses to release it for use by other tasks.
8. A). User friendliness.
B). Cost.
C). Availability.
D). Portability.
E). Hardware configuration/compatibility.
F). User needs.

Review questions 4

1. Explain the following mouse concept:
A). Click B). Double click C). Drag and drop
2. Define the following terms:
A). Desktop B). Icon C). Sidekik menu D). Taskbar
3. List and explain the three parts of a task bar.
4. Why is it important to first shut down the computer before you turn it off?
5. Explain how you would move the taskbar to the top of the desktop.
6. With the help of the teacher and a computer running Windows, customise the taskbar such that:
 - A) The start menu is displayed in small icons;
 - B) The clock is not displayed;
 - C) The taskbar is hidden;
 - D) A program is added on or removed from the start menu.

Answer of review questions 4-1

- A). Press and release left mouse button.

B). Press left and mouse button twice in rapid succession.

C). Move an item to another location using the mouse.
- A). Is mostly an empty screen that appears when Windows starts and has some standard icons that show that the computer is ready for use.

B). Is a graphical representation of a command, file, folder or storage location.

C). A submenu that appears either on the right or left of a main menu.

D). A long strip/icon that runs across the desktop and displays active tasks.
- A). Start button – provides access to start menu.

B). Task manager – displays buttons of currently running tasks.

C). System tray – displays icons of applications that automatically start and run in the background.

Answer of review questions 4-2

4. A). To avoid damaging storage devices that may still be in use.
B). To avoid damaging system and application files.
C). To avoid loss of data and information.
5. Right click task bar then select properties. In the taskbar properties dialog, check the appropriate options then click *Apply* button then *OK*.
6. a). Right click on an empty part on the task manager then properties.
b). Use the Task Manager properties.

Review questions 5-1

1. Define the following terms:
A). File B). Folder C). Subfolder D). Folder tree
2. Distinguish between system files and application files.
3. Describe two functions of a file.
4. In reference to Windows operating systems, what does the term *application window* mean?
5. Explain each of the following commands as used to manage files and folders:
A). Rename B). Sort files C). Copy
D). Move D). Delete

Review questions 5-2

6. Of the five commands in Question 5, which two must be used with a lot of caution when manipulating files.
7. Why is it important to give descriptive names to a file or folder.
8. Draw a directory tree showing how files and folders are organised by an operating system.
9. Explain how you would:
 - A) Minimise and maximise a window;
 - B) Close and exit an application window;
 - C) Move a window from one location to another;
 - D) Access the folder/directory tree.
10. Briefly explain the importance of each part of a window.

Answer of review questions 5-1

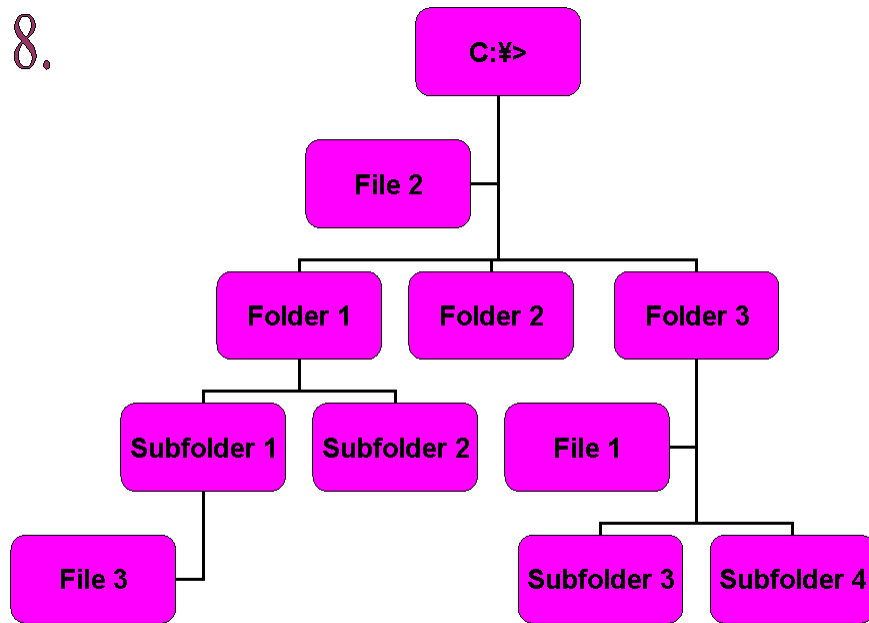
1. A). A label that represents a logical or physical storage location.
B). The rectangular area on the screen covered by a running program.
C). Interactive strip at the bottom of an application window that acts as a communication link between the user and the application program.
D). Is a row of buttons/icons that represent shortcut commands.
E). Is the hierarchical arrangement of folders and storage locations from the root downwards.
2. System files store data/system information while application files hold programs data.
3. Organise data/information records.

Answer of review questions 5-2

4. It is a rectangular area that is opened in the application program when one wants to enter data in the new file.
5. **A). Change name of file/folder.**
B). Arranges files/folder in particular order.
C). Makes a duplicate of existing file/folder.
D). Removes file/folder from storage.
6. **Rename – renaming an application or system file may make the computer or program to fail.**
Delete – may lead to loss of data and programs.
Move – moving a system folder or file may cause the computer fail.
7. For easy location or identification.

Answer of review questions 5-3

8.



9. A). minimize – click minimize button.
Maximize – click maximize button.
B). Click the close button or Exit from “File” menu.
C). Point to title bar and drag.
D). Right click “My computer” icon then select “Explore” command
10. Title bar – displays title.
Toolbars – display shortcut commands.
Work area – allow user to enter data.
Menu bar – provides a list of commands.
Status bar – provides a communication interface between user and the application.

Review questions 6-1

1. Define the following terms as used in disk management:
A). Formatting a disk; B). Disk partitioning;
C). Disk compressing; D). Defragmentation;
2. Explain how you would format a used disk in Windows.
3. You have realised that your floppy disk is limited in storage space and you would wish to create more space.
A) Which tool in Windows would you use;
B) Write down the procedure of doing (a) above.
4. Explain how you would create backup using Windows backup utility.

Review questions 6-2

5. When you switch on your computer, and realise that it is not loading the operating system. This means that you have to boot up your computer using a startup disk.
 - A) **What is a startup disk.**
 - B) Using a new diskette, crate a Windows Startup disk and label it “*Windows-System Disk*” (The dashes represent the version of Windows you are using).
6. **Why is hard disk partitioned?**
7. Explain how you can partition a 30GB hard disk into 2GB partitions.

Answer of review questions 6

- A). It is creation of tracks and sectors on a disk.
B). **Creating volumes by subdividing a large physical disk.**
C). Creating more space on a disk by squeezing files into a smaller
D). **Consolidating related files into one location on the disk.**
- Right click its icon on the screen then select format command.
- A). **Compression agent or DriveSpace.**
B). The teacher to give appropriate answer depending on the version of Windows.
- Right click "My computer" icon then properties. Click tools tab then click Backup now button.**
- A). A special disk that has bootup files.
B). **Teacher to help pupil to create a startup disk.**
- A). To install more than one operating systems.
B). **For the purpose of backup.**
- Boot in MS-DOS mode using a startup disk then at the prompt type FDISK and follow the on-screen instructions.

Revision questions

1. Explain how windows organises information in reference to files and folders.
2. Why must an operating system be installed in the computer before installing any other software.
3. Differentiate between compressing and defragmenting a disk.
4. Give one advantage of partitioning a disk.
5. Explain why a new disk must be formatted before using it.
6. Identify the various resources that are controlled by the operating system.
7. How would you identify the minimum system requirements for the version of Windows running on the computer you are using.
8. Differentiate between scheduling and sequencing of tasks by the operating system.
9. What is troubleshooting?

Answer of revision questions 1

1. It stores related data and information records into files and related files into folders and sub folders on a drive.
2. **Because it does the basic functions of enabling other programs access the hardware resources.**
3. Compressing squeezes files to create more space while defragmenting consolidates files and folders in a contiguous space or location on the disk.
4. **When one partition fails, the other can still be used.**
5. To create tracks and sectors that can be recognized by a particular operating system.

Answer of revision questions 2

6. (a). The processor.
(b). Memory
(c). Input/output devices and ports.
(d). Communication devices and ports.
(e). Secondary storage devices.
7. Read the Manufacturers manual or Readme.txt file form the Windows folder.
8. Scheduling determines which task will be processed first, while sequencing arranges the tasks and keeps a list of currently running tasks.
9. Diagnosing hardware and software related problems and trying to resolve the problems.

Practical activity 1

1. With the help of the teacher the pupil should identify the type(s) and versions of operating system(s) installed on the computers.
2. Study the start menu and identify the menu items that display other submenus when the mouse pointer points at them.
3. Right click “My computer” icon and list down the commands displayed on the shortcut menu.
4. Click the start button. Explain the importance of each of start menu items displayed.

Practical activity 2

- Using the Explorer window:
 1. Create three folders *RICE*, *FRUITS* and *VEGETABLES* in the root of your floppy drive A.
 2. In the *FRUITS* folder, create two subfolders, *ORANGE* and *MANGOES*.
 3. In fruits folder, create a WordPad file called *SALES* with the following details:
 - *During this season, fruit sales have gone down sue to the prevailing weather conditions. I hope the situation will improve, otherwise people are going to experience health problems since fruits are very important in providing body protection.*

Practical activity 3

1. With the help of the teacher, find out the following from either the Microsoft manuals that come with an original copy of the operating system, or from a special file called *Readme.txt* found in the Windows folder on the hard disk.
 - A) The minimum requirements for installing the operating system you are using.
 - B) Install a copy of Windows on one of the computers that has no operating systems in the computer room.
2. Give a detailed account of the installation process.

END

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