

# COMPUTER STUDIES

FORM 3 – TERM II

---

KAMUZU BARRACKS COMMUNITY DAY SECONDARY SCHOOL

## COMPUTER COMPONENTS

A computer is made up of **two main** components namely:

- **Hardware**
- **Software**

**Hardware** refers to the **physical or tangible** components that make up a computer system.

The hardware components are classified into **four** categories namely:

- Input devices
- Central Processing Unit (CPU)
- Output devices
- Storage devices

# COMPUTER COMPONENTS

---

**Software** refers to a **set of instructions** that direct a computer on what to do.

OR

We can also define software as a **collection of instructions** that tell a computer what to do.

Computer software is mainly classified into **two main** categories namely:

- System software
- Application software

CHAPTER: TWO

# COMPUTER HARDWARE

---

Computer hardware is mostly made up of the **system unit** and the **peripheral devices** that are connect to the system unit. In this section we will start by discussing the components of a system unit.

- A system unit is the part of a computer that houses the primary devices that performs operations and produce results for complex calculations.
- The systems unit mainly houses six main hardware components namely:
  - **Motherboard**
  - **Processor (Central Processing Unit)**
  - **Primary (Main) memory (Random Access Memory)**
  - **Secondary memory (Hard drive)**
  - **Video Card**
  - **Power Supply**

CHAPTER: TWO

# COMPUTER HARDWARE

Apart from housing the main six components, the system unit also houses other components like:

- Data cables / Buses
- Cooling systems (fans or liquid cooling systems)
- Speakers
- Expansion cards slots

CHAPTER: TWO

# COMPUTER HARDWARE

Six main components of the system unit

## 1. Central Processing Unit – CPU

- This is the most important component of a computer. It is also called:
  - i. The **Processor**
  - ii. The **Microprocessor**
- The CPU is regarded as the brain of the computer because all the processing activities are carried out inside it.
- Inside the system unit the CPU is located (mounted) on a circuit board known as the **motherboard** or the **system board**.
- On the motherboard, a CPU is just one of the many Integrated Circuits (IC). Figure 1 below show an example of a CPU chip.

CHAPTER: TWO

# COMPUTER HARDWARE



Figure 1: Integrated Circuit - Intel CPU

CHAPTER: TWO

# COMPUTER HARDWARE

- The CPU consist of **three** functional elements namely:
  - **Control Unit**
  - **Arithmetic and Logic Unit**
  - **Main memory**
- The **Control Unit**
  - This is a functional element that **coordinates** all processing activities in the CPU as well as input, storage and output operation.
  - It determines which operation or instruction is to be executed next.
  - The control unit uses the **system clock** to coordinate all activates.
  - The system clock send electric signals (pulses) as its means of communication.
  - The number of pulses per second determines the speed of a microprocessor.

CHAPTER: TWO

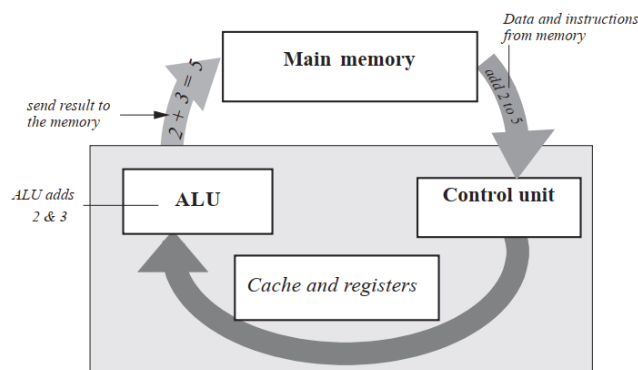
# COMPUTER HARDWARE

- The faster the clock pulses, the faster the CPU, hence the faster the computer can process any given data.
- The **Arithmetic and Logic Unit (ALU)**
  - This is a unit of the CPU where all the arithmetic and logical operations are carried out.
  - The basic arithmetic operations are **addition**, **subtraction**, **multiplication**, and **division**.
  - The Logic operations are based on the computer's capacity to **compare** two or more values. For example, it may compare whether a piece of data is greater than or less than or equal to or not equal to.
  - In order for the ALU to be able to process data, it has special temporary storage locations called **registers**. These registers are use to hold data just before processing and just after processing.

CHAPTER: TWO

# COMPUTER HARDWARE

- Figure 2 below show the functional elements of the CPU



**Figure 2:** Functional elements of the CPU

CHAPTER: TWO

# COMPUTER HARDWARE

Main components of the system unit

## 2. The motherboard

- This is the main and biggest printed circuit board inside the system unit.
- It forms the foundation of a computer system, it allocates power and allows communication to and between the CPU, RAM, and all other hardware components inside the system unit.
- The motherboard serves as a single platform to connect all the parts of a computer together.
- The motherboard can also be considered as the **backbone** of a computer system.
- Figure 3 below shows an illustration of a motherboard.

CHAPTER: TWO

# COMPUTER HARDWARE



**Figure 3:** Computer motherboard / System board

CHAPTER: TWO

# COMPUTER HARDWARE

---

Main components of the system unit

## 3. Main memory

- Main memory refers to type of storage that is directly accessible by the processor.
- This type of memory is also called **primary storage**.
- Computer main memory can be classified into:
  - i. **Read Only Memory (ROM)**
  - ii. **Random Access Memory (RAM)**

Let's look at these classes of computer memory.

CHAPTER: TWO

# COMPUTER HARDWARE

---

## Read Only Memory (ROM)

- This type of memory is used to store programmed instructions and data **permanently** or **semi-permanently**.
- The data and instructions stored in ROM remain unchanged for long periods of time.
- This type of memory is found in special purpose computers.
- We have **four types** of ROM namely:
  1. **Mask Read Only Memory (MROM)** – Once the data or instruction is written on the memory by the manufacturer, it cannot be changed.
  2. **Programmable Read Only Memory (PROM)** – This type of memory only allows the user to change the written content (data or instruction) only once.
  3. **Erasable Programmable Read Only Memory (EPROM)** – This has a transparent quartz window through which its contents can be erased by exposing it to ultra violet (UV) light, and then reprogrammed for another use.

CHAPTER: TWO

# COMPUTER HARDWARE

4. **Electrically Erasable Programmable Read Only Memory (EEPROM)** – This is a type of ROM that can be erased and reprogrammed using electricity. A good example of this type of ROM is the **BIOS** (*Basic Input/Output System*) memory.

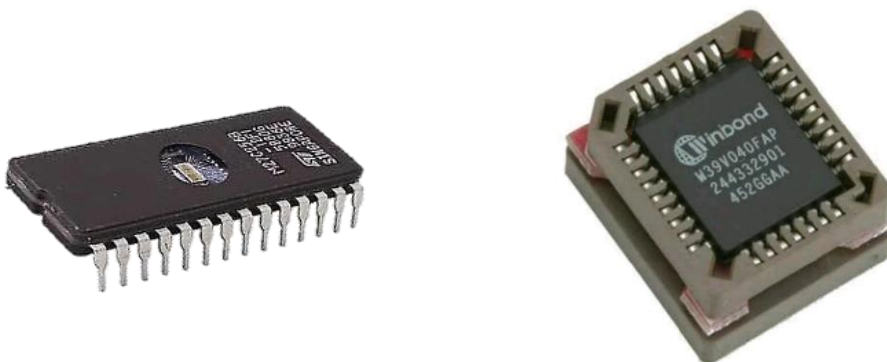
## CHARACTERISTICS OF READ ONLY MEMORY (ROM)

- ROM is non-volatile in nature: this means that its content is not lost when the computer is switched off.
- One can **only read** its content but **cannot write** on it unless it is a special type of ROM.
- It stores permanent or semi-permanent instructions from the manufacturer, called firmware.

CHAPTER: TWO

# COMPUTER HARDWARE

Figure 4 below shows Read Only Memory Chips



**Figure 4:** Read Only Memory chips

CHAPTER: TWO



# COMPUTER HARDWARE

## Random Access Memory (RAM)

- This is the type of memory that is used to hold instructions and data needed by the currently running applications.
- Random Access Memory is also known as **working storage**.
- The data, instruction or information in RAM is continually read, changed, and removed.
- It is called Random Access Memory because its content can be read directly regardless of the sequence in which it was stored.
- We have **two main** types of RAM:
  - Static RAM (SRAM)** – this is the fast type of memory mostly **located inside** a microprocessor. SRAM is used on special purpose memories such as cache memory.

**Cache memory** is used to enhance the processing speed by holding data and instructions that are instantly required by the processor.

CHAPTER: TWO

# COMPUTER HARDWARE

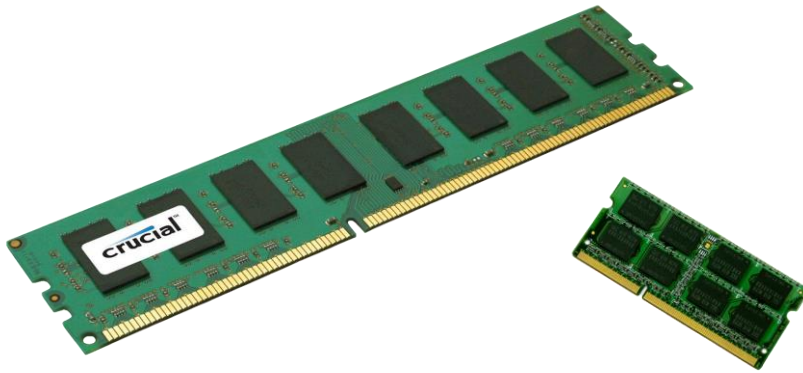
- We have **two main** types of RAM:
  - Dynamic RAM (DRAM)** – this type of RAM is slower as compared to SRAM. It is called dynamic because of the tendency for the stored charge to leak away, even with constant power supply. DRAM requires periodic recharging to maintain its data storage.

Figure 5 below shows an example of Random Access Memory chips.

CHAPTER: TWO

# COMPUTER HARDWARE

---



**Figure 5:** *Random Access Memory chips*

CHAPTER: TWO

# COMPUTER HARDWARE

---

## CHARACTERISTICS OF RANDOM ACCESS MEMORY

- Data can be read (*retrieved*) and written (*stored*) in it.
- RAM is **volatile** in nature – that means its content is lost when the computer is switched off.
- The speed of a computer depends on RAM.
- The content in RAM is user defined – that is to say the user dictates what is to be contained in RAM.

CHAPTER: TWO

# COMPUTER HARDWARE

## SPECIAL PURPOSE MEMORIES

- Some types of memory are included inside a microprocessor or in some input/output devices in order to enhance/improve performance.
- These memories include:
  - a. **Cache memory** – This is a fast type of RAM. We have three types of cache, namely:
    - i. **Level 1 (L1)** – Known as primary cache and it is located inside the microprocessor.
    - ii. **Level 2 (L2)** – Known as external cache and might be located inside the microprocessor or mounted on the motherboard.
    - iii. **Level 3** – Last type of cache that works with L2 cache to optimise system performance.

CHAPTER: TWO

# COMPUTER HARDWARE

- a. **Buffers** – This is a special type of memory that is found in input/output devices. The input data is held in the input buffer while the processed output is held in the output buffer.
- b. **Registers** – This is the type of memory found inside the CPU and they hold one piece of data at a time.

Examples of registers:

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

CHAPTER: TWO

## Revision Questions

1. Describe the **two** components that make up a computer system. (4 marks)
2. List the **six** main components found inside the system unit. (6 marks)
3. Name a component found inside the system unit that is considered as the backbone of a computer system. (1 mark)
4. What is the different between Random Access Memory (RAM) and Read Only Memory (ROM). (4 marks)
5. Describe any **three** types of Read Only Memory (ROM). (6 marks)
6. List the three types of registers. (3 marks)

CHAPTER: ONE

## Reference Websites

- [https://www.tutorialspoint.com/computer\\_fundamentals/computer\\_motherboard.htm](https://www.tutorialspoint.com/computer_fundamentals/computer_motherboard.htm)
- <https://blog.gatestlab.com/2018/04/13/system-unit-components/>
- <https://www.techopedia.com/definition/2308/system-unit>

CHAPTER: ONE