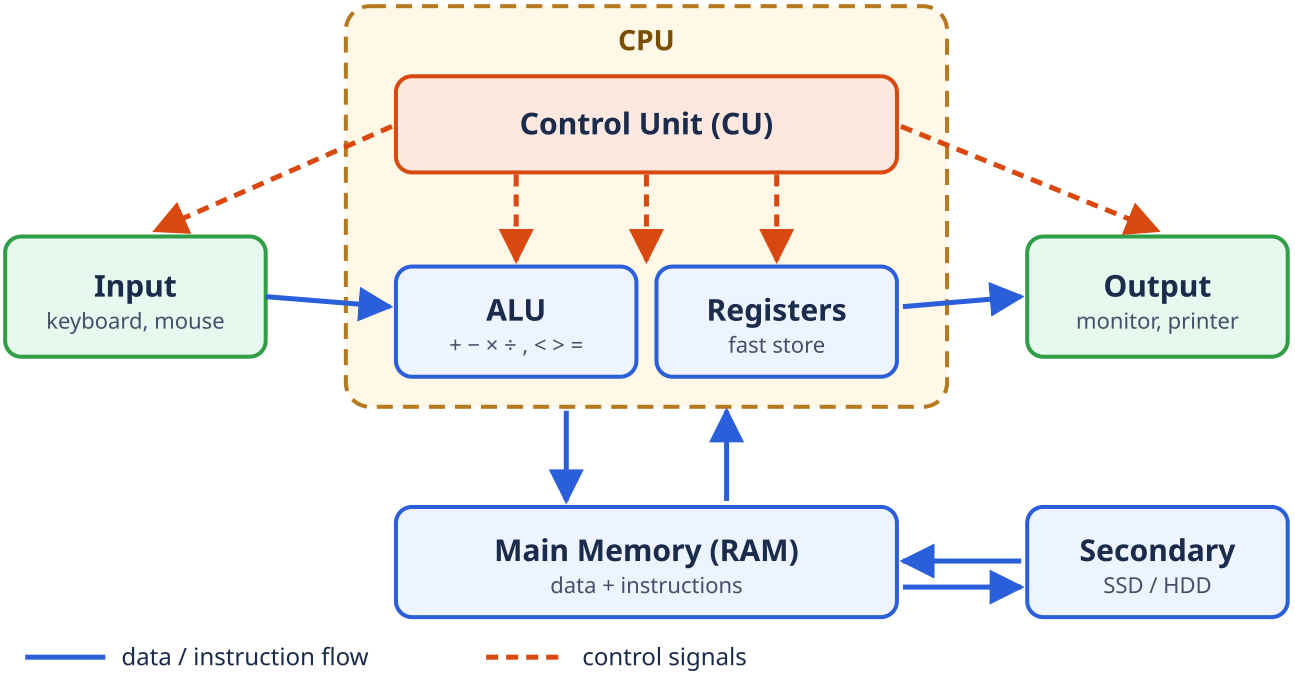
G.C.E. O/L Grade 10 ICT · Lesson 2

2.4 Computer Block Diagram: ALU, Control Unit and Memory

A **block diagram** is a simple picture that shows the main parts of a computer as boxes and how data, instructions and control signals move between them. In this note you will learn the parts of the CPU – the **ALU**, the **Control Unit** and **registers** – and how they work with memory, input and output.

1. The block diagram



Block diagram of a computer. Solid blue arrows = data and instructions; dashed orange arrows = control signals from the Control Unit.

The diagram has **input** on the left, **output** on the right and the **CPU** in the middle. The CPU works closely with **main memory (RAM)**, and RAM gets programs and files from **secondary storage** (SSD/HDD).

2. Parts of the CPU

Control Unit (CU)
The 'manager'. Reads each instruction from memory, decodes it and sends **control signals** to tell every other part what to do and when.

Arithmetic Logic Unit (ALU)
The 'calculator'. Does **arithmetic** (+ − × ÷) and **logic** operations (compare: greater than, less than, equal; AND, OR, NOT).

© 2026 schoolict.net (Ruwan Mangala Suraweera) · All rights reserved

Registers
Very small, very fast memory places **inside** the CPU. They hold the instruction and the data being worked on right now.

💡 Think of a school canteen: the Control Unit is the manager giving orders, the ALU is the cashier doing the sums, registers are the cashier's hand holding the coins right now, and RAM is the counter where today's items are kept.

3. Memory in the diagram

- **Main memory (RAM)** holds the programs and data the CPU is using now. It is fast but loses data when power is off.
- **ROM** keeps start-up (boot) instructions permanently.
- **Cache** is very fast memory between RAM and the CPU to save time.
- **Secondary storage** keeps everything permanently; files are loaded from it into RAM.

4. Three kinds of flow (signals)

Flow	What moves	Example
Data flow	Numbers, text, pictures being processed	Marks 45 and 38 go from RAM to the ALU
Instruction flow	Program steps (what to do)	'ADD the two marks' goes from RAM to the CU
Control signals	Commands from the CU (read, write, start, stop)	CU tells the ALU 'add now' and RAM 'store result'

5. The machine cycle (fetch – decode – execute)

Fetch
The CU gets the next instruction from RAM.

Decode
The CU works out what the instruction means.

Execute
The ALU (or another part) does the job and the result is stored.

Example: adding two marks. **Input** – the teacher types 45 and 38. They go to **RAM**. The **CU** fetches the 'add' instruction, the **ALU** adds them (83), the answer is kept in a **register**, then stored in RAM and shown on the **monitor** (output).

NEW 2026 Modern CPUs have many **cores** (each core is like a mini CPU with its own CU and ALU) so phones and laptops can do many jobs at once. Many also have a **GPU** for graphics and an **NPU** for AI tasks like voice typing in Sinhala.

© 2026 schoolict.net (Ruwan Mangala Suraweera) · All rights reserved

Key Words

Block diagram – A diagram that shows the main parts of a system as boxes joined by arrows.

Control Unit – Part of the CPU that fetches and decodes instructions and sends control signals.

ALU – Arithmetic Logic Unit – does calculations and comparisons.

Register – A tiny, very fast memory location inside the CPU.

Main memory – RAM – holds programs and data the CPU is using now.

Cache – Very fast memory between the CPU and RAM.

Control signal – A command sent by the CU to other parts (read, write, start).

Data flow – Movement of data between parts of the computer.

Instruction – One step of a program telling the CPU what to do.

Fetch-decode-execute – The repeating cycle the CPU uses to run each instruction.

Core – A processing unit inside a CPU; multi-core CPUs do many jobs at once.

Logic operation – A comparison or decision such as greater than, equal, AND, OR.

Sample Q&A

1. Name the three main parts of the CPU.

> **Answer:** Control Unit (CU), Arithmetic Logic Unit (ALU) and registers.

2. What is the job of the Control Unit?

> **Answer:** It fetches and decodes instructions and sends control signals to manage all parts.

3. Give two operations done by the ALU.

> **Answer:** Arithmetic (e.g. addition) and logic (e.g. comparing if A > B).

4. What are registers?

> **Answer:** Tiny, very fast memory locations inside the CPU that hold the current instruction and data.

5. List the steps of the machine cycle.

> **Answer:** Fetch, decode, execute (then store the result).

6. What is the difference between data flow and control signals?

> **Answer:** Data flow carries the data being processed; control signals are commands from the CU telling parts what to do.

© 2026 schoolict.net (Ruwan Mangala Suraweera) · All rights reserved

MCQ

1. Which part of the CPU does calculations and comparisons?

A. RAM
B. Monitor
C. ALU
D. Control Unit

2. Which part sends control signals to all other parts?

A. ALU
B. Hard disk
C. Control Unit
D. Keyboard

3. Tiny, very fast memory locations inside the CPU are called:

A. Registers
B. Ports
C. Peripherals
D. SSDs

4. Comparing whether 45 is greater than 38 is a(n):

A. Input operation
B. Storage operation
C. Output operation
D. Logic operation

5. What is the correct order of the machine cycle?

A. Decode → Execute → Fetch
B. Fetch → Execute → Decode
C. Fetch → Decode → Execute
D. Execute → Fetch → Decode

6. In a block diagram, the dashed arrows from the CU usually show:

A. Printer paper
B. Control signals
C. Internet links
D. Electricity cables

7. Which memory holds the program the CPU is running right now?

A. Cloud storage
B. Pen drive
C. DVD
D. RAM (main memory)

© 2026 schoolict.net (Ruwan Mangala Suraweera) · All rights reserved

8. Which memory stores the start-up (boot) instructions permanently?

A. ROM
B. Cache
C. RAM
D. Register

9. Very fast memory placed between the CPU and RAM is:

A. Flash drive
B. Cache
C. HDD
D. ROM

10. During ‘decode’, the Control Unit:

A. Turns off the computer
B. Works out what the instruction means
C. Prints the result
D. Saves to the cloud

11. Data typed on the keyboard goes FIRST to:

A. Main memory (RAM)
B. The ALU directly, skipping memory always
C. The printer
D. The monitor only

12. A multi-core CPU means:

A. It uses only analog data
B. It has several processing units to do many jobs at once
C. It has many keyboards
D. It has no memory

13. Which of these is NOT part of the CPU?

A. Control Unit
B. Registers
C. ALU
D. Hard disk

14. ‘ADD the two numbers’ is an example of a(n):

A. Instruction
B. Port
C. Peripheral
D. Network

© 2026 schoolict.net (Ruwan Mangala Suraweera) · All rights reserved

Structured Questions

1. (i) Draw a labelled block diagram of a computer. (4 marks)
(ii) Show data flow and control signals using two kinds of arrows. (2 marks) *(6 marks)*

> (i) Boxes: Input → CPU (Control Unit, ALU, registers) ↔ Main memory → Output; secondary storage ↔ memory.
> (ii) Solid arrows for data/instructions; dashed arrows from CU to all parts for control signals; include a key.

2. State the function of: (i) Control Unit (ii) ALU (iii) registers. *(6 marks)*

> (i) Fetches and decodes instructions; sends control signals to coordinate all parts. (ii) Does arithmetic (+ − × ÷) and logic (compare, AND/OR/NOT). (iii) Hold the current instruction, data and results temporarily inside the CPU.

3. Explain the fetch-decode-execute cycle with an example. *(4 marks)*

> Fetch – CU gets the instruction (e.g. ADD 45, 38) from RAM; Decode – CU understands it is an addition; Execute – ALU adds and gives 83; result stored in a register/RAM. The cycle repeats for the next instruction.

4. Distinguish between data flow, instruction flow and control signals. (3 marks) *(3 marks)*

> Data flow – values being processed (e.g. marks). Instruction flow – program steps going from memory to the CU. Control signals – commands from the CU (read, write, add) to other parts.

5. Give two differences between RAM and registers. *(4 marks)*

> Location: registers are inside the CPU, RAM is outside on the motherboard. Size: registers are tiny (bytes), RAM is large (GB). Speed: registers are faster.

6. Why do modern phones have multi-core CPUs and an NPU? (3 marks) *(3 marks)*

> Multi-core: several cores run many apps/tasks at the same time, so the phone is faster. NPU: special unit for AI tasks (face unlock, voice typing, photo enhancement) – faster and uses less battery.

Summary

- A block diagram shows input, CPU, memory, storage and output with arrows.
- CPU = Control Unit + ALU + registers.
- Control Unit fetches/decodes instructions and sends control signals.
- ALU does arithmetic and logic (comparisons).
- Registers and cache are tiny, very fast memories; RAM holds running programs; ROM holds boot instructions.

© 2026 schoolict.net (Ruwan Mangala Suraweera) · All rights reserved

- Three flows: data, instructions and control signals.
- Machine cycle: fetch → decode → execute → store.
- Modern CPUs: many cores, GPU for graphics, NPU for AI.

MCQ answer key – 2.4

1. **C** – ALU = Arithmetic Logic Unit.
2. **C** – The CU is the manager.
3. **A** – Registers hold current data and instructions.
4. **D** – Comparisons are logic operations done by the ALU.
5. **C** – First get, then understand, then do.
6. **B** – Control signals are drawn differently from data flow.
7. **D** – Programs are loaded into RAM to run.
8. **A** – ROM is non-volatile.
9. **B** – Cache speeds up access.
10. **B** – Decode = understand the instruction.
11. **A** – Input data is stored in memory before processing.
12. **B** – Each core can process separately.
13. **D** – The hard disk is secondary storage outside the CPU.
14. **A** – An instruction tells the CPU what to do.

© 2026 schoolict.net (Ruwan Mangala Suraweera). All rights reserved.