

1.1 – Systems architecture

Sub topic

Guidance

1.1.1 Architecture of the CPU

- The purpose of the CPU:
 - The fetch-execute cycle
- Common CPU components and their function:
 - ALU (Arithmetic Logic Unit)
 - CU (Control Unit)
 - Cache
 - Registers
- Von Neumann architecture:
 - MAR (Memory Address Register)
 - MDR (Memory Data Register)
 - Program Counter
 - Accumulator

Required

- ✓ What actions occur at each stage of the fetch-execute cycle
- ✓ The role/purpose of each component and what it manages, stores, or controls during the fetch-execute cycle
- ✓ The purpose of each register, what it stores (data or address)
- ✓ The difference between storing data and an address

Not required

- * Knowledge of passing of data between registers in each stage

1.1.2 CPU performance

- How common characteristics of CPUs affect their performance:
 - Clock speed
 - Cache size
 - Number of cores

Required

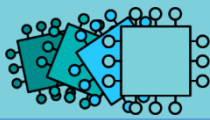
- ✓ Understanding of each characteristic as listed
- ✓ The effects of changing any of the common characteristics on system performance, either individually or in combination

1.1.3 Embedded systems

- The purpose and characteristics of embedded systems
- Examples of embedded systems

Required

- ✓ What embedded systems are
- ✓ Typical characteristics of embedded systems
- ✓ Familiarity with a range of different embedded systems

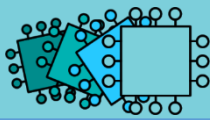


Name:

In this unit you will learn about:

- The purpose of the CPU
- The Von Neumann architecture
- Common CPU components and their function
- How common characteristics of CPUs affect their performance
- Embedded systems

Grade	Target	Depth	Understanding	Comment
7-9		All aspects complete	All work is accurate	
5-6		Most aspects complete	Most work is accurate	
3-4		Some aspects complete	Some work is accurate	
1-2		Little work complete	Little work is accurate	
Response:				



About the CPU

What the central processing unit (CPU) does:

The CPU has a small amount of memory on the chip called registers.

The registers are called:

Acronym:

Purpose:

Stores the location in memory to be used by the MDR. Holds the address of where data is to be fetched or stored.

Holds the data fetched from, or to be written to the memory.

Holds the address of the next instruction.

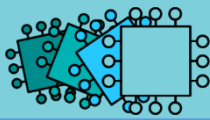
Holds the results of calculations.

The CPU also has these components:

This component performs calculations, e.g. addition/subtraction and logical decisions, e.g. does this equal...?

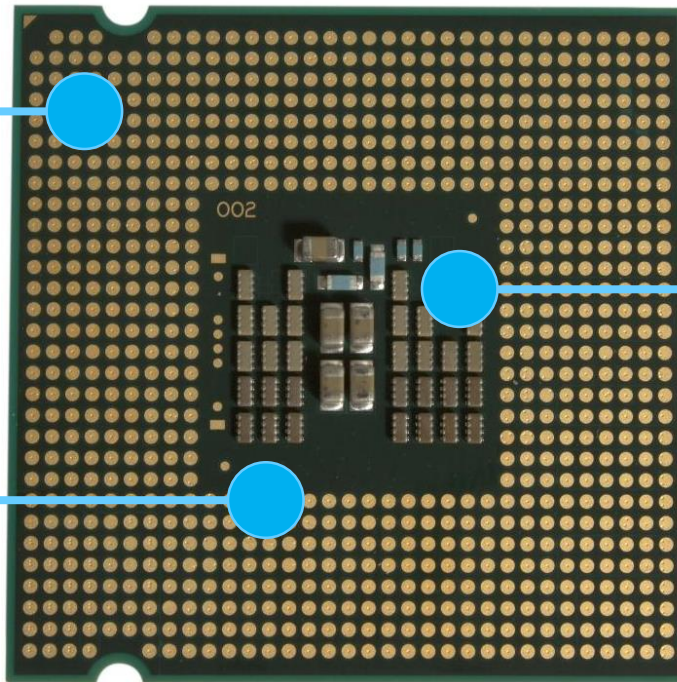
This component decodes instructions and sends signals to control how data moves around the CPU.

This memory provides fast access to frequently used instructions and data without having to go to the main memory (RAM).



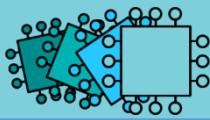
Factors affecting the speed of the CPU

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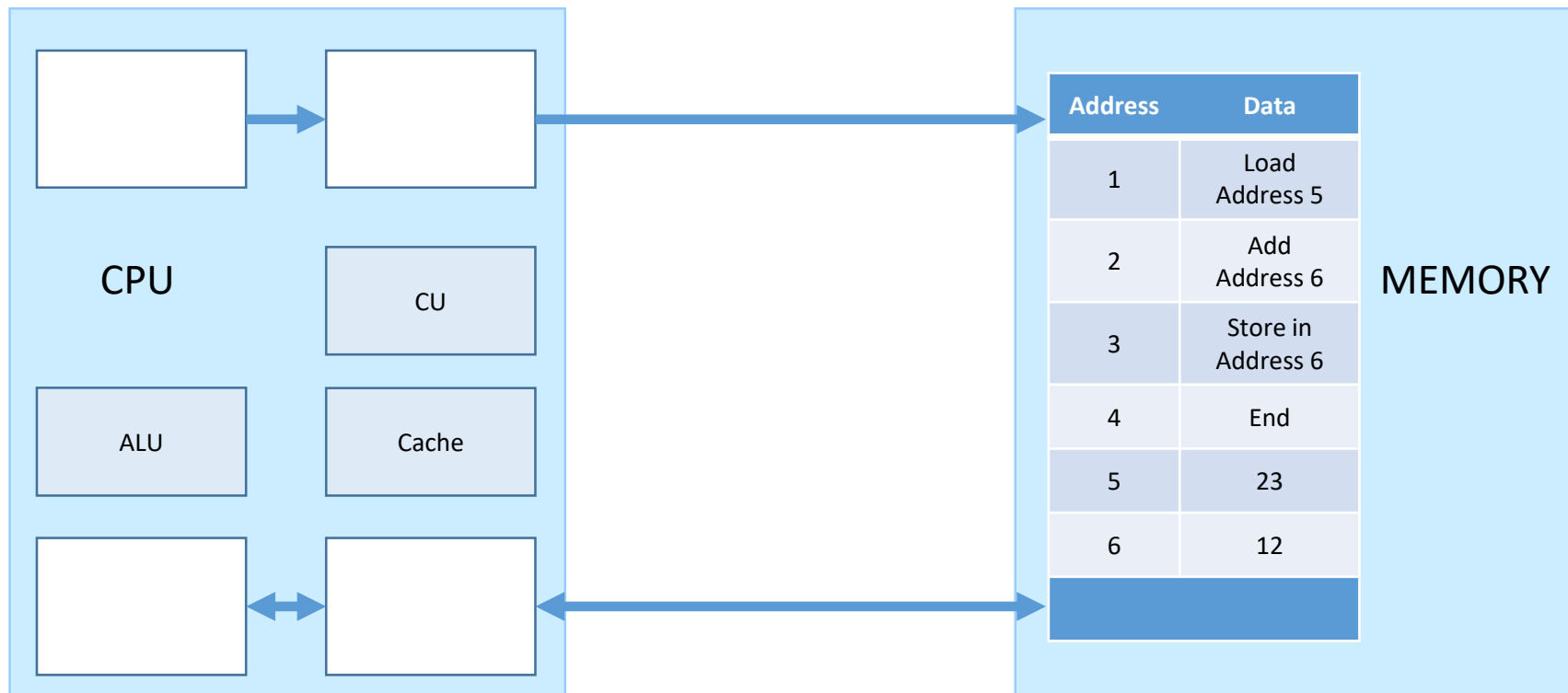


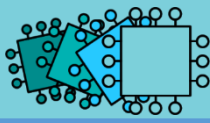
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How the CPU works: the Von Neumann architecture





Embedded systems

Embedded systems are:

Examples of embedded systems: