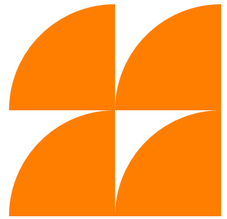


AIIS
Department of Applied Mathematics and Statistics



Computer Architecture

I2-AMS

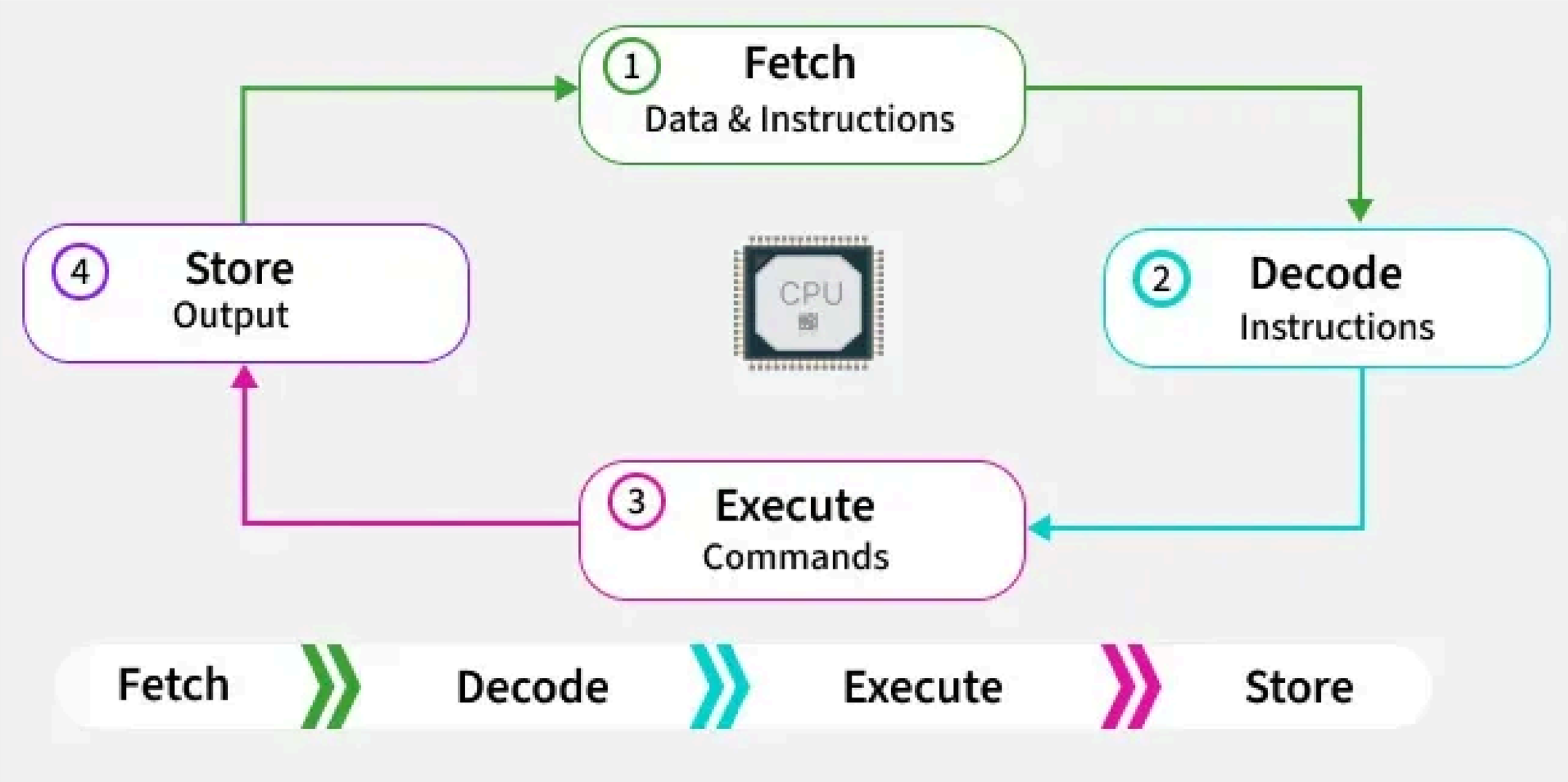
WEEK 2

BY: PHALLY RATHAVANN

Revision

1. What is an “Input Device” and an “Output Device”?
2. In a computer, how many main units are there?
3. What is a CPU? What does CPU stands for?
4. Where can you find a CPU?
5. What is a RAM? What does RAM stands for?
6. What is the difference between RAM and SSD?
7. What is another name for “mother board”?
8. Compare a “Hard Disk” to an “SSD”.

Main Functions of CPU



CPU Register

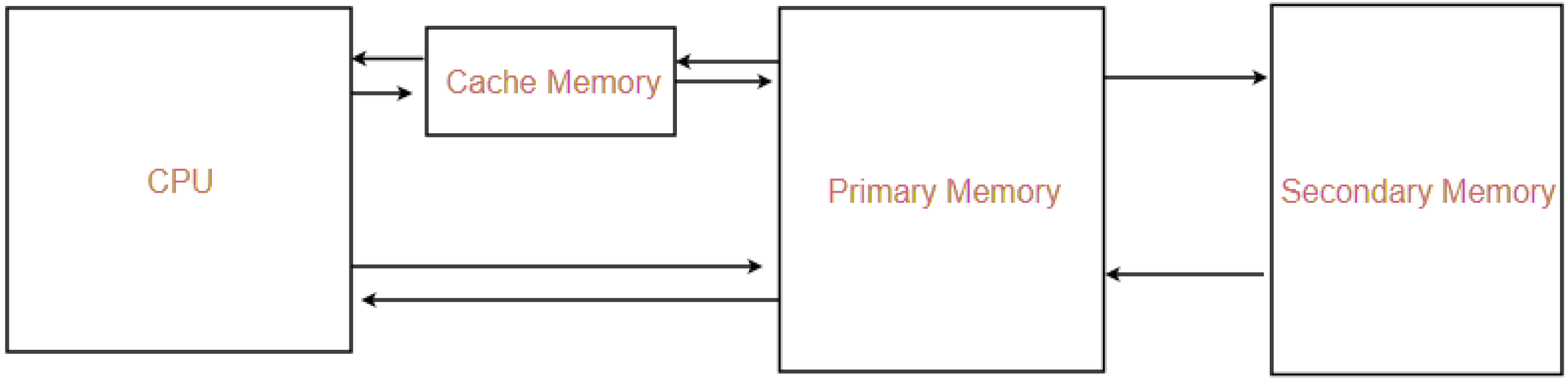
CPU registers are high-speed memory units essential for efficient program execution, enabling quick access to frequently used values involved in processing. They play a crucial role in data manipulation, memory addressing, and tracking processor status. While accessing instructions from RAM is faster than from a hard drive, it's still not quick enough for the CPU, which is why registers are used to store and retrieve data faster.

Register Symbol	Number of Bits	Register Name	Function
OUTR	8	Output register	OIt holds output character.
INPR	8	Input register	It holds input character.
PC	12	Program Counter	It holds the address of the instruction.
AR	12	Address Register	It holds an address for memory.
DR	16	Data Register	It holds memory operand.
AC	16	Accumulator	It’s a processor register.
IR	16	Instruction Register	It holds an instruction code.
TR	16	Temporary Register	It holds temporary data.

Cache Memory

Cache memory is a small, high-speed storage area in a computer. It stores copies of the data from frequently used main memory locations. There are various independent caches in a CPU, which store instructions and data.

- The most important use of cache memory is that it is used to reduce the average time to access data from the main memory.
- The concept of cache works because there exists locality of reference (the same items or nearby items are more likely to be accessed next) in processes.



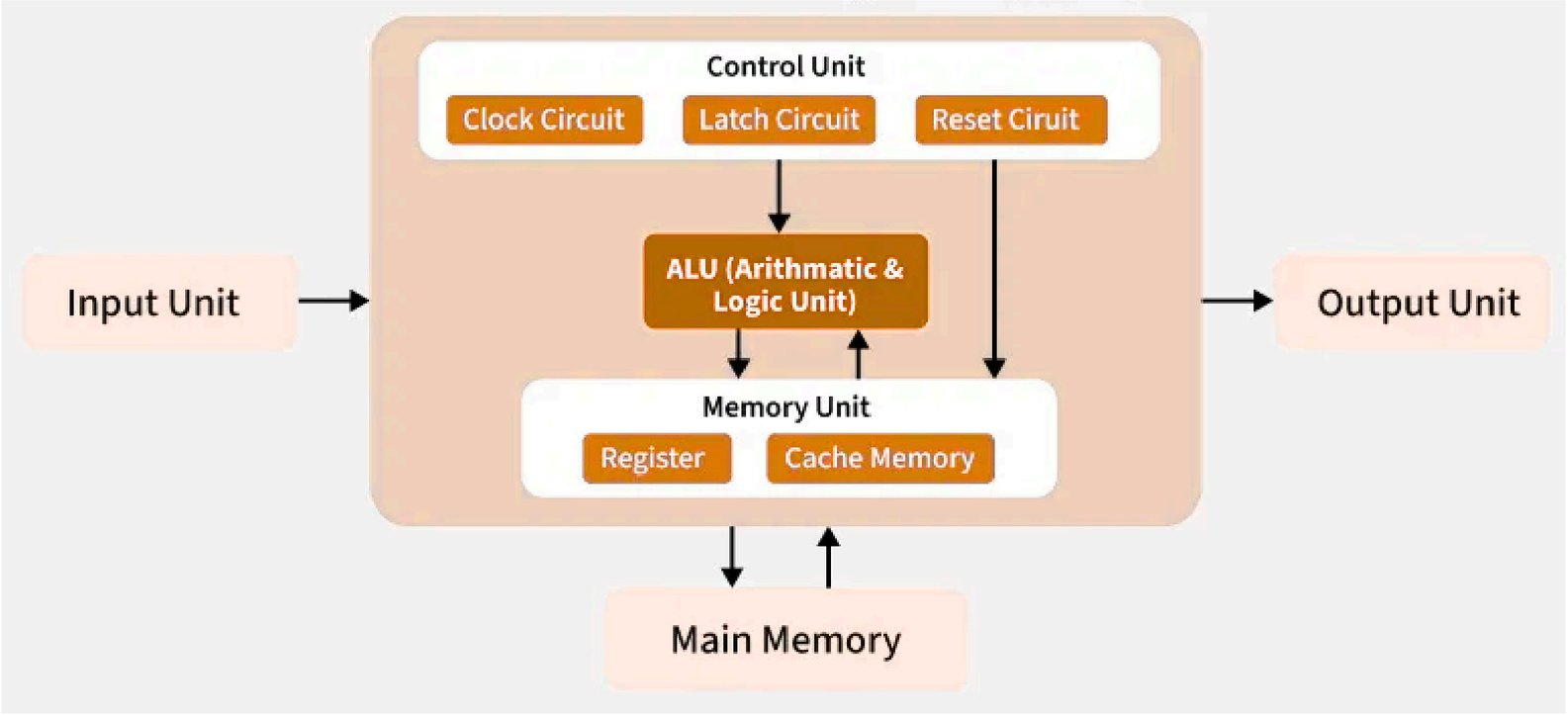
Types of Cache Memory

1. L1 or Level 1 Cache: It is the first level of cache memory that is present inside the processor. It is present in a small amount inside every core of the processor separately. It is integrated directly into the CPU core (Fastest). The size of this memory ranges from 2KB to 64 KB.
2. L2 or Level 2 Cache: It is the second level of cache memory that may present inside or outside the CPU. If not present inside the core, It can be shared between two cores depending upon the architecture and is connected to a processor with the high-speed bus. The size of memory ranges from 256 KB to 512 KB. It is larger than L1 but slightly slower.
3. L3 or Level 3 Cache: It is the third level of cache memory that is present outside the CPU and is shared by all the cores of the CPU. Some high processors may have this cache. This cache is used to increase the performance of the L2 and L1 cache. The size of this memory ranges from 1 MB to 8MB.

Main components of CPU

The CPU is the **brain** of a computer, containing all the circuitry needed to process input, store data, and output results.

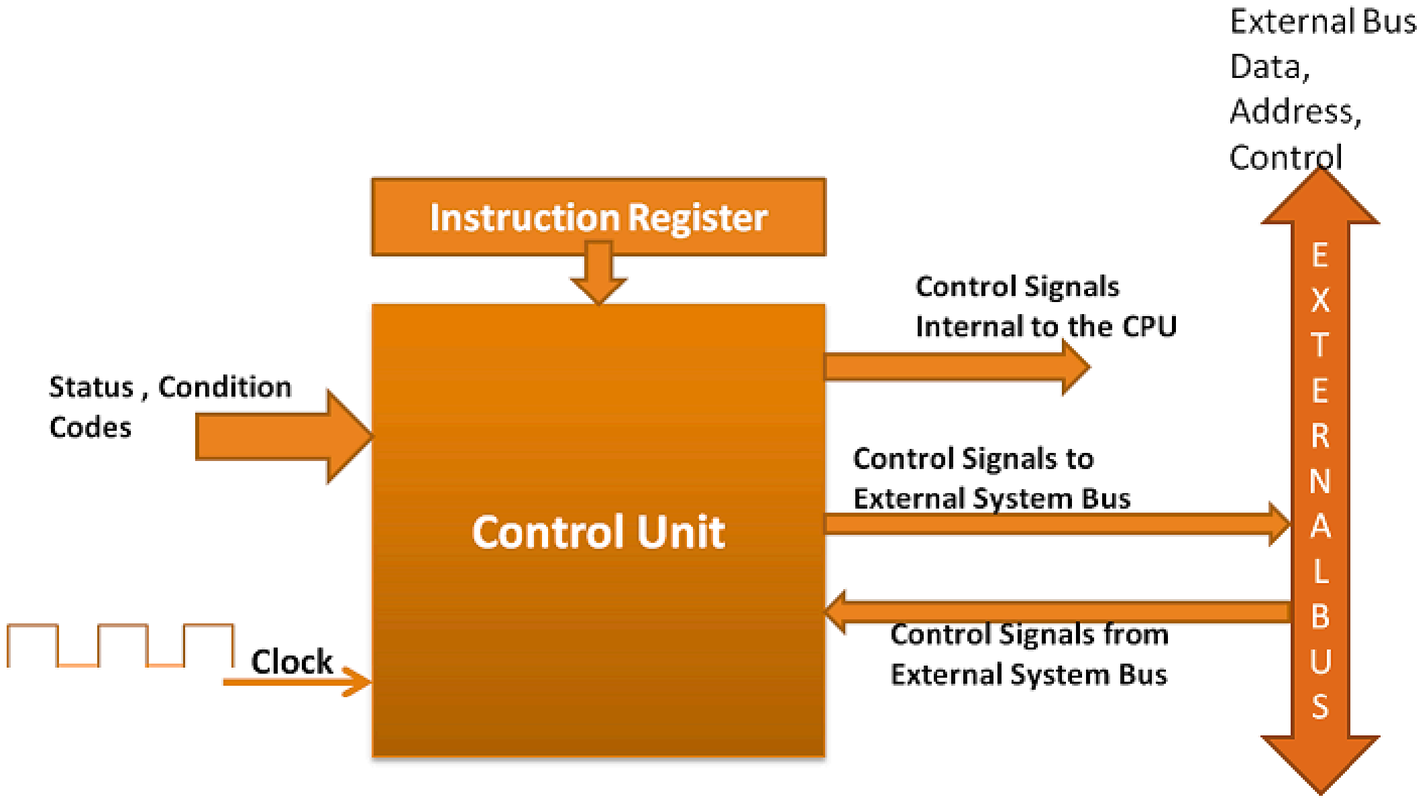
The components of a CPU include the ALU (Arithmetic Logic Unit), CU (Control Unit), registers, cache, and clock.



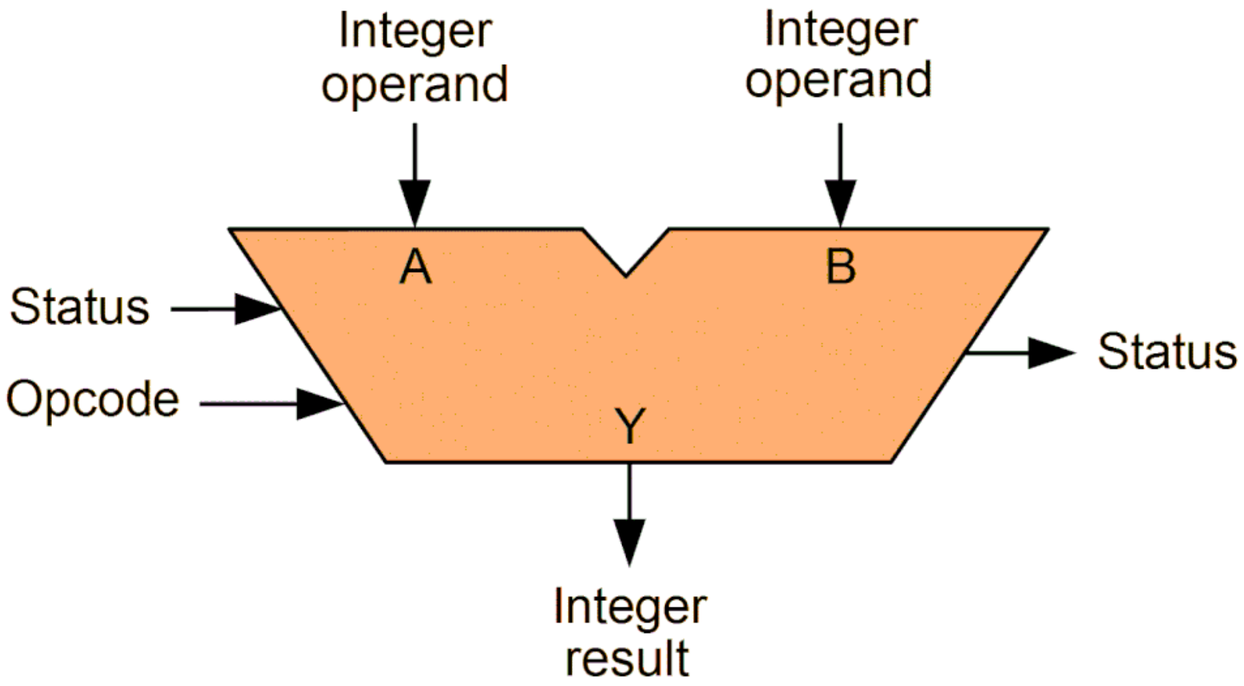
Control Unit

The control unit is the part of the computer's central processing unit (CPU) which directs the operation of the processor. It fetches instructions from memory, decodes them, and generates control signals to manage the ALU, memory, and I/O devices.

- Its role is to coordinate instruction execution, and its functions vary depending on CPU architecture.
- Devices that need a Control Unit (CU) include CPUs and GPUs.



Arithmetic Logic Unit (ALU)



The ALU is a digital circuit within the CPU that performs all arithmetic and logical operations. It takes input from registers, processes the operation, and sends the result back to a destination register or memory.

- Performs operations like addition, subtraction, AND, OR, NOT, XOR, etc.
- Controlled by the control unit based on the instruction type.

Q&A

Work TP2

1. What are the main functions of the CPU in a computer system? Please detail about those main functions.
2. How do the control unit and arithmetic logic unit (ALU) work together in a CPU? Please make sure to include more detail.
3. What is the role of registers in a CPU? Please explain the detail about the role of registers in CPU.
4. What are the differences between input, output, and storage peripherals?
    a. Peripherals are external or internal devices that allow data to be inputted, outputted, or stored.
5. What is the role of the input-output module in a computer system? Why is the I/O module important?