Introduction and review of the computer architecture

Questions to the topic:

1. Draw a schematic diagram of a computer's CPU and label it. List the functionality of each component.
2. Differentiate and distinguish between different types of computers in terms of their functionality, namely, supercomputer, desktop, laptop, and hand-held device.
3. Compare and contrast between a 'Register' and a 'Memory' cell. Provide examples where necessary.

1. Diagram of a computer's CPU

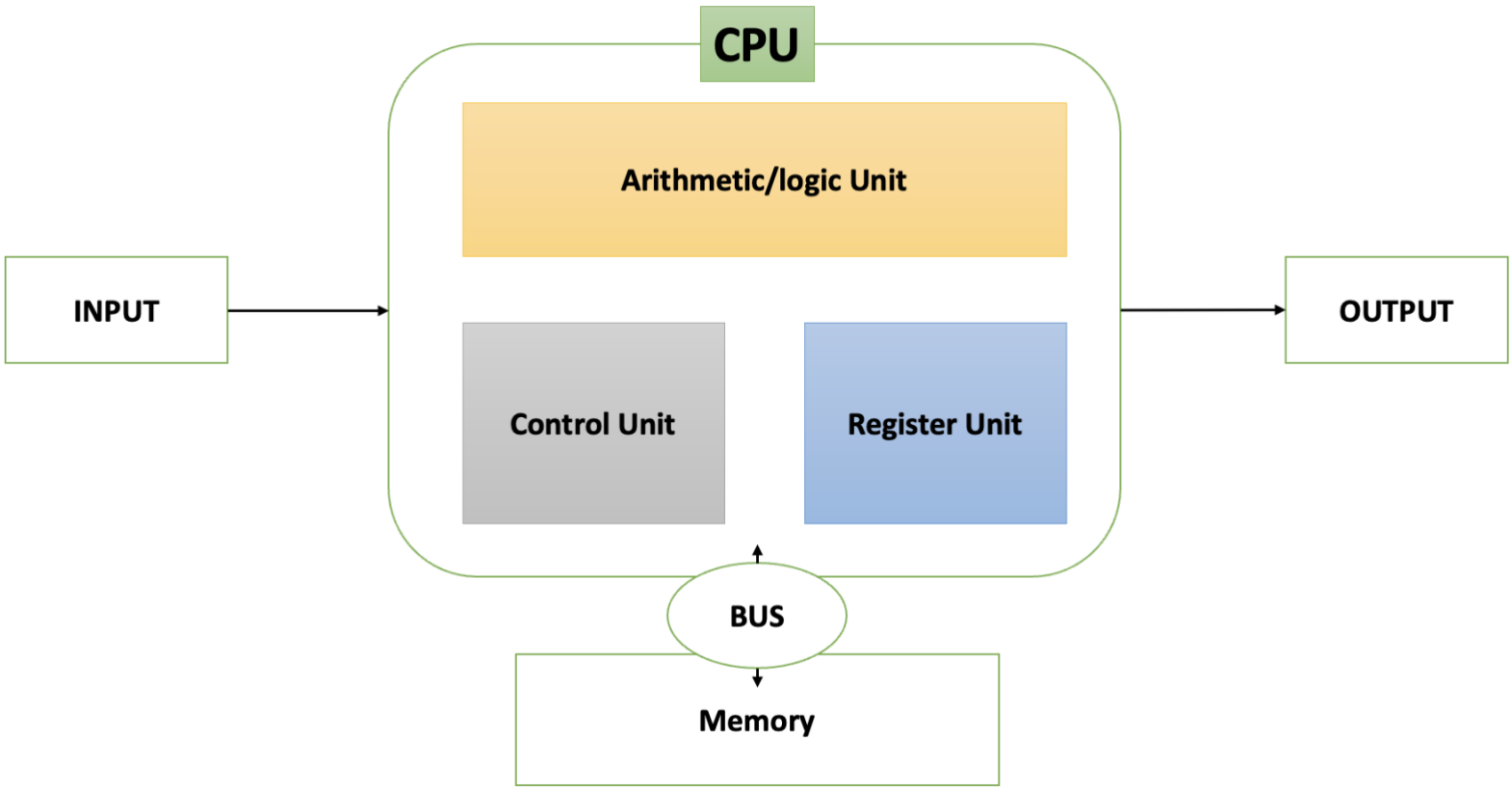

Figure 1: Process of CPU (Own representation based on Brookshear & Brylow, 2019: 112)

CPU: The central processing unit (CPU) is the machine's core, which manipulates the data and run the system.

Arithmetic/ Logic Unit: The Unit is responsible for data operation, for example, addition.

Control Unit: The task of this unit is the coordination of machine's actions.

Register Unit: With the help of the register unit, the CPU can process the data. In addition, the unit temporarily stores a small amount of data for processing and executing the instructions.

Memory: The Memory stores data with the use of the bus.

Bus: The bus transfers the memory data to the CPU machine and the other way around.

Input & Output: The CPU receive the data through the input and send the data through the output (Brookshear & Brylow, 2019: 112-114).

2. Different types of Computers

Classifications of the computer types:

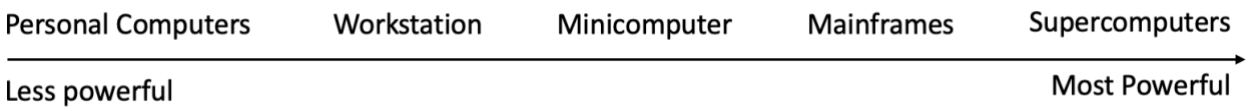

Figure 2: Computer size and power (Mecklemedia, n.d.)

Computer types based on the size, power and purpose:

Personal computer: Computers are usually small, on the basis on microprocessors and used by single user. They are inexpensive, use to manage businesses and to entertain someone at home. Personal computers distinguish between:

1. ***Desktop*:** The desktop model fits on a desk, and a monitor usually stands on the top of the computer. The computer is wide and low, not tall compared to a tower model.
2. ***Notebook computer*:** A Notebook is typically very light, flat, portable (Battery included) and all essential inputs such as monitor, keyboard and mouse. Nowadays, the CPU of notebooks is as powerful as personal computer.
3. ***Laptop:*** A laptop is comparable to a notebook. It used to be thicker and heavier.
4. ***Hand-held computer:*** These computers are tiny and convenient to hold in one hand. However, consumers prefer notebooks to a hand-held computer because of the small keyboard and screen. Nowadays, manufacturers use hand-held computers to make manufacturing efficiently.

Workstation: It's related to a personal computer; however, the microprocessor and monitor is more powerful.

Minicomputer: A minicomputer is suitable for a use from a wide range of users at the same time.

Mainframe: It has the same functionality as a minicomputer, but it can provide access to hundreds of users simultaneously.

Supercomputer: The supercomputer is the most powerful computer which can execute millions of instructions per second and is rightly very expansive. It deploys, for example, in weather forecast and dynamic calculations (Mecklemedia, n.d.).

Computer types based on data type:

Digital: Personal Computers

- Laptops, PCs, mobile phones, desktops, etc

Analog: Process analog data; reading the change and provide output

- Speedometer, thermometer, frequency, and signal of voltage.

Hybrid: Input in analog, output in digital

- Measuring the heartbeat of the patients (ECG machine), measuring earthquakes and other natural calamities.

Computer types based on the functionality:

Workstation: Suitable for heavy-duty function

- Animation, CAD, audio & video editing, professional gaming (Apple PowerBook G4).

Servers: Assisting other computer by sharing data and resources

- Cloud server, application server, database server, file server, etc.

Embedded: Mix of software and hardware components and part of a larger system

- GPS systems, centralized heating systems, fitness trackers, digital watches, electronic calculators, etc. (ArtOfTesting, 2021).

3. Register and Memory cell

Category	Register	Memory
Basic	Holds the data which the CPU is presently processing	Holds the data which is necessary for the process
Capacity	Range from 32-bits to 64-bits	Range from GB to TB
Access	Faster	Slower
Type	Accumulator register, program counter, instruction register, address register	RAM

Table 1: Comparison between Register and Memory (TechDifferences, 2020)

References:

ArtOfTesting (2021) Types of Computers. Available from: https://artoftesting.com/types-of-computers#:~:text=Information%20appliances-,Types%20of%20Computers%20based%20on%20Data%20Type,as%20Digital%2C%20Analog%20and%20Hybrid. [Accessed 21 March 2022].

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