EDULiTO

Systems Architecture

Topic Tests

Photocopiable Resources

Terms and Conditions of Use

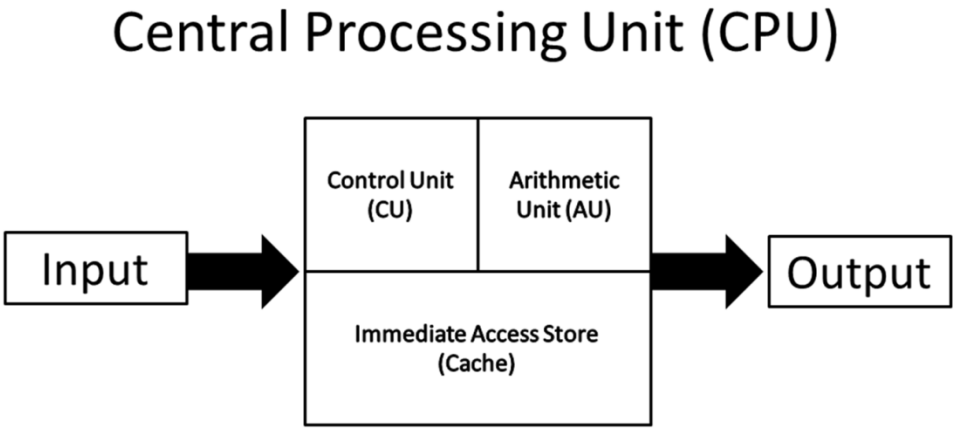
Your school has permission to copy this resource as many times as you require and to use it as you wish within your school/organisation.

You do not have permission to distribute it as a paper or electronic document to other schools or organisations.

Any questions? Email: edulitolearn@gmail.com

Topic Test - Systems Architecture

1. Below is a diagram to show some of the features of a CPU. A CPU can be found inside computer devices.



(a) Describe the role played by the CPU in a computer device [2]

……

……

……

What is the role played by each of the following components within the CPU?

(b) Control Unit [1]

……

……

……

(c) Arithmetic Unit [2]

……

……

……

……

(d) Cache [2]

……

……

……

(e) Some CPUs perform better than other CPUs. Apart from the amount of cache in a CPU, list two other factors that influence the performance of a CPU and for each explain how the characteristic listed can improve performance. [4]

Factor 1 ……

Explanation

……

……

……

Factor 2 ……

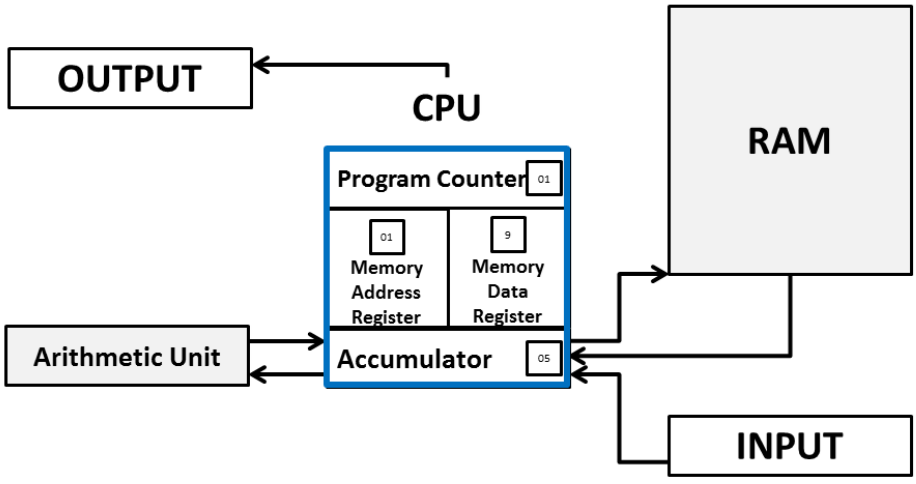
Explanation

……

……

……

2. The diagram below shows a pictorial representation of Von Neumann architecture.



In relation Von Neumann architecture what is the role played by the:

(a) The Memory Address Register (MAR)? [2]

……

……

……

(b) The Memory Data Register (MDR)? [2]

……

……

……

(c) The Program Counter (PC)? [3]

……

……

……

……

……

(d) The Accumulator?[2]

……

……

……

3. Many devices that we find around us, both at home and in the wider world, can be described as embedded systems.

(a) Give an example of an embedded system. [1]

……

(b) Explain the purpose of this embedded system, including a description of three hardware components that are part of the embedded system. [3]

……

……

……

(c) Give another example of an embedded system. [1]

……

(d) Explain the purpose of this embedded system, including a description of three components that are part of the embedded system. [3]

……

……

……

Topic Test - Systems Architecture - Mark Scheme			
Question Number	**Answer**	**Additional Guidance**	**Mark**
1 a	It is the "brain" of the computer [1 mark] It interprets/executes/processes program instructions. [1 mark]		**2**
1 b	The control unit directs the operation of the processor. [1 mark]	**It tells the computer's memory, arithmetic/logic unit and input and output devices how to respond to a program's instructions.**	**1**
1 c	It is used to perform arithmetic [1 mark] and logic operations [1 mark] within the CPU.		**2**
1 d	A cache used by the CPU to reduce the average time to access data from the main memory. [1 mark] Therefore allowing the CPU to process data more quickly.[1 mark]	**The cache is a smaller, faster memory which stores copies of the data from frequently used main memory locations.**	**2**
1 e	Factor: Clock speed. [1 mark] The more instructions that are processed each second the faster the CPU. [1 mark] Factor: Number of cores. [1 mark] By putting more cores in a chip you can get more processing done at the same time, therefore improving CPU performance. [1 mark]		**4**
2 a	The Memory Address Register (MAR) is a register that **stores** the memory address from which data will be fetched to the CPU or the address to which data will be sent and stored. [2 marks]	1 mark for stores memory address	**2**
2 b	The Memory Data Register (MDR) is the register of a computer's control unit that contains the **data** to be stored in the computer storage(e.g. RAM), or the data after a fetch from the computer storage. [2 marks]	1 mark for stores data	**2**
2 c	A program counter is a register in a computer processor that contains the address (location) of the instruction being executed at the current time. [1 mark] As each instruction gets fetched, the program counter increases its stored value by 1. [1 mark] After each instruction is fetched, the program counter points to the next instruction in the sequence. [1 mark]		**3**
2 d	The accumulator is a register in which arithmetic and logic results are stored. [1 mark] Preventing the need to write the results of each calculation to main memory. [1 mark]		**2**
3 a	e.g. Digital Camera Smoke detector Microwave Oven	Any appropriate example	**1**

3 b	Purpose relates to device chosen. E.g. a smoke detector detects smoke and a speaker emits an alarm. Components linked to purpose. E.g. • Power Supply • Processor • Memory • Timers • Serial communication ports • Input/Output circuits • Sensors		**3**
3 c	e.g. Digital Camera Smoke detector Microwave Oven	Any appropriate example	**1**
3 d	Purpose relates to device chosen. E.g. a smoke detector detects smoke and a speaker emits an alarm. Components linked to purpose. E.g. • Power Supply • Processor • Memory • Timers • Serial communication ports • Input/Output circuits • Sensors		**3** **/28**