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Course : Computer Architecture and Logic Design

Assignment 1

Question

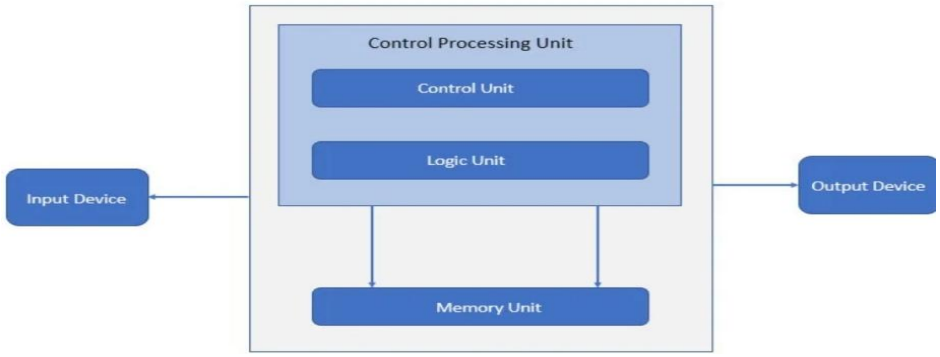
Explore different existing architectures and updated computer organizations procedures. Diagrammatically depict these two concepts. Differentiate between ARMs and MIPs.

Existing Architectures and updated Computer Organizations

1- **Von-Neumann Architecture:**

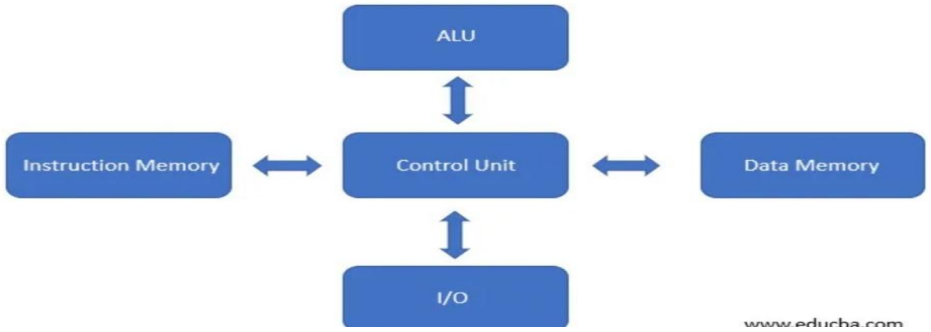
Now a day's computer we are using are based on von-neumann architecture. It is based on some concepts.

We have a single read/write memory available for read and write instructions and data.We can address the contents of memory by its location irrespective of what type of data and instructions are present in the memory, because of which we can read or write any data and instructions. Execution always occurs in a sequential manner. There is a bus used for instruction and data code execution. Input device takes data or instruction and the (CPU) performs one operation at a time, either fetching data or instruction in/out of the memory. Once the operation is done it is sent to the output device.



2- Harvard Architecture

It is used when data and code is present in different memory blocks.It has data storage entirely contained within the (CPU). A single set of clock cycles is required. The pipeline is possible. Harvard architecture has different access codes and data address spaces that is, the instruction address zero is not the same as data address zero. Instruction address zero identifies 24-byte value and data address zero identifies 8-byte value which is not the part of the 24-byte value.
It has a common address space for the separate data and instruction cache and digital signal processors.



3- **Instruction Set Architecture**

It has a set of instructions that the processor understands. It has two instruction sets, one is RISC (reduced instruction set computer) and the second is CISC (complex instruction set computer).

4- **Microarchitecture**

Microarchitecture is known as computer organizations and it is the way when instruction set architecture is a built-in processor. Instruction set architecture is implemented with various microarchitectures and it varies because of changing technology.It reads the instruction and decodes it, will find parallel data to process the instruction and then will process the instruction and output will be generated.

5- **System Design**

The design will satisfy user requirements such as architecture, module, interfaces and data for a system and it is connected to product development. It is the process of taking marketing information and creating product design to be manufactured. Modular systems are made by standardizing hardware and software.

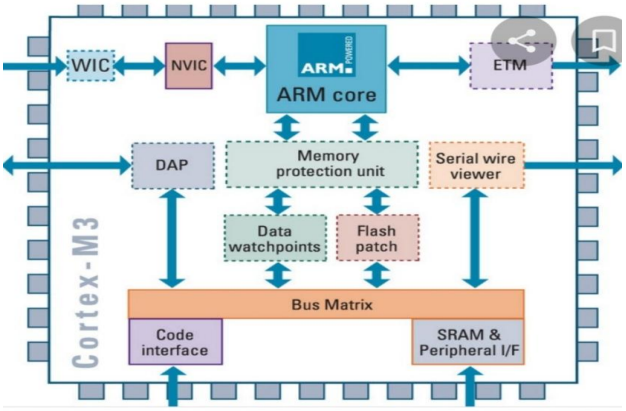
Difference

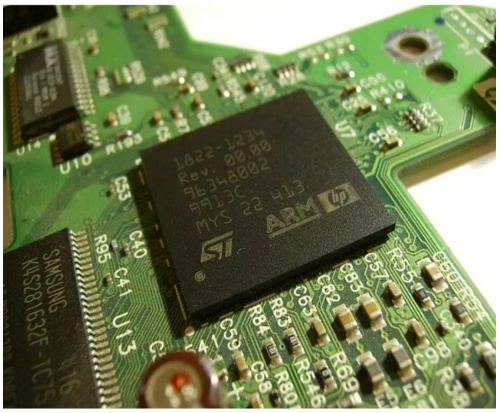
ARMs	MIPs
ARM processors are a family of central processing units (CPUs) based on a reduced instruction set computer (RISC) architecture.	MIPS is an approximate measure of a computer's raw processing power. MIPS figures can be misleading because measurement techniques often differ, and different computers may require different sets of instructions to perform the same activity.
ARM has only 16 registers	MIPS has 32 registers.
ARM has a higher throughput and greater efficiency than MIPS because ARM processors support 64-bit data buses between the core and the caches.	MIPs have lower efficiency.
ARM provides only general purpose registers for arithmetic operations and all the other functions, but MIPS provides two separate registers to hold the results of multiply operation.	In order to allow efficient context switching, MIPS architecture supports the implementation of multiple banks of registers.
All ARM data processing instructions set the ALU condition codes by default.	MIPS provides the SLT for comparison.
ARM architecture was introduced in 1985.	MIPS was designed and introduced by MIPS Technologies in 1981.
Arm instruction set can be divided into six broad classes of instructions such as Branch instructions, Data-processing instructions, Load and store instruction, Coprocessor instructions and Exception-generating instructions.	There are three types of MIPS instructions and they are R, I and J. Every instruction starts with a 6 bit opcode. In R type instructions, there are 3 registers, a shift mount field and a function field. In I type instructions, there are two registers and a 16 bit immediate value while J type instructions follow opcode with a 26 bit jump target.
There are 16 general purpose registers called R0 to R15 in the ARM ISA and each	MIPS has 32 integer registers in order to perform arithmetic operations.

has a size of 32-bits.	
ARM stands for **Advanced RISC Machine.**	MIPs stands for **Million instructions per second.**
ARMs has equivalent instructions.	MIPS has no equivalent instruction to the ARM MOV instruction.
ARM architectures are used in smartphones, tablet computers, PDAs and other mobile devices.	MIPs architecture is used in making smart phones, supper computers, embedded systems
Example The engineering is built into the Raspberry Pi product, a RISC machine that fits into the pocket of a user and works on 256 MB of random access memory (RAM).	**Example** If a computer completed 2 million instructions in 0.10 seconds . X = 2 million/0.10 = 20 million.

Diagram

ARMs





MIPs