MICROPROCEESORS & ADVANCED MICRO CONTROLLERS

DSP Vs MICROPROCESSOR

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KEY DIFFERENCE

MICROPROCESSOR:

The purpose of a microprocessor is to accept digital data as input, process it as per the instructions, and then provide the output.

DSP:

The DSP processor, on the other hand, is a particular type of microprocessor. DSP stands for digital signal processing. It is basically any signal processing that is done on a digital signal or information signal.

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DIGITAL SIGNAL PROCESSOR

DSP processor :

- Instruction cycle - Instruction is executed in a single cycle of the clock.

- Instruction execution - parallel execution is possible.

- Suitable for - Array processing operation.

- Addressing mode - Direct and indirect addressing mode.

- Computational units - Three separate computational units: ALU, MAC, Sifter.

- Address generation - Address is generated combine by DAGs and program sequencer.

- Program flow control - Program sequencer and instruction register take care of the flow of a program.

- Memories - Separate data and program memories.

DIGITAL SIGNAL PROCESSOR

DSP processor :

- Operand fetch and memory - Multiple operands are fetched simultaneously.

- On-chip address and data buses - Separate address and data buses for program and data memory i.e DMA, DMD, PMD, PMA, and R bus.

- Pipelining - Pipelining is implicating through the instruction register and instruction cache.

- Address and data bus multiplexing - They are not multiplexed both are separated on-chip as well as off-chip.

- Application - Speech processing, audio processing, signal processing, and array processing, etc.

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MICROPROCESSOR

- Instruction cycle - Multiple clock cycle is required for the execution of one instruction.

- Instruction execution - Execution instruction is always sequential.

- Suitable for - general-purpose processing.

- Addressing mode - Direct, indirect register, register indirect, immediate, etc.

- Computational units - Only main unit: ALU.

- Address generation - The program counter is incremented sequentially to generate an address.

- Program flow control - The program counter takes care of the flow of execution.

- Memories - Normally no such separate memories are present.

- Operand fetch and memory - Operand is fetched sequentially.

MICROPROCESSOR

- On-chip address and data buses - Address and data bus are the two bus on the chip.

- Pipelining - Queuing performs explicate by one queue register to support pipelining.

- Address and data bus multiplexing - Address and data bus are multiplexed.

- Application - General purpose applications.

Fixed vs. Floating Point

Characteristic	Floating point 32-bit	Fixed point 16-bit
Dynamic range	much larger	smaller
Resolution	comparable	comparable
Ease of programming	comparable	comparable
Compiler efficiency	much easier	more difficult
Power consumption	more efficient	less efficient
Chip cost	comparable	comparable
System cost	comparable	comparable
Design cost	less	more
Time to market	faster	slower

P.Ramya/IoT System Architecture/19ECT213/Introduction to Arduino & Node MCU 06.02.2021