SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

COIMBATORE-35

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE NAME: 19EEB303 / Microcontroller and its Applications

III YEAR / VI SEMESTER

Unit III – **IOT - ARCHITECTURE REFERENCE MODEL**

Topic:Need for ARM

ARM processor and its Features

- **A Advanced RISC Machine (ARM)** Processor is considered to be the family of a Central Processing Units that are used in the music players, smartphones, wearables, tablets and the other consumer electronic devices. Advanced RISC Machines create a ARM processor architecture hence the name is ARM.
- This needs very few instruction sets and transistors. It is very small in size. This is the reason that it is a perfect fit for small-size devices.
- It has less power consumption along with reduced complexity in its circuits.
- They can be applied to various designs such as 32-bit devices and embedded systems. They can even be upgraded according to user needs.

ARM processor and its Features

What is ARM Processor?

- An ARM processor is a widely-used computer chip known for its efficiency and versatility.
- Designed by ARM Limited using a streamlined RISC architecture these processors are licensed to various companies rather than manufactured directly.
- ARM unique business model allows tech companies to customize and build processors for diverse devices, from smartphones and tablets to computers and smart devices.
- Their exceptional balance of processing power and energy efficiency has made them the preferred choice for mobile computing, enabling longer battery life without compromising performance.

ARM processor and its Features

Multiprocessing Systems

ARM processors are designed to be used in cases of multiprocessing systems where more than one processor is used to process information. The First AMP processor introduced by the name of ARMv6K could support 4 CPUs along with its hardware.

Tightly Coupled Memory

The memory of ARM processors is tightly coupled. This has a very fast response time. It has low latency (quick response) that can also be used in cases of cache memory being unpredictable.

ARM processor and its Features

Memory Management

ARM processor has a management section. This includes Memory Management Unit and Memory Protection Unit. These management systems become very important in managing memory efficiently.

Thumb-2 Technology

Thumb-2 Technology was introduced in 2003 and was used to create variable-length instruction sets. It extends the 16-bit instructions of initial Thumb technology to 32-bit instructions. It has better performance than previously used Thumb technology.

ARM processor and its Features

ne-Cycle Execution Time

ARM processor is optimized for each instruction on the CPU. Each instruction is of a fixed length that allows time for fetching future instructions before executing the present instructions. ARM has CPI (Clock Per Instruction) of one cycle.

Pipelining

Processing of instructions is done in parallel using pipelines. Instructions are broken down and decoded in one pipeline stage. The channel advances one step at a time to increase throughput (rate of processing).

ARM processor and its Features

A large number of Registers

A large number of registers are used in ARM processors to prevent large amounts of memory interactions. Records contain data and addresses. These act as a local memory store for all operations.

Difference between ARM and x86

ARM	x86
ARM uses Reduced Instruction Set Computing Architecture (RISC).	x86 uses Complex Instruction Set Architecture (CISC).
ARM works by executing single instruction per cycle.	x86 works by executing complex instructions at once and it requires more than one cycle.
Performance can be optimized by a Software-based approach.	Performance can be optimized by Hardware based approach.
ARM processors require fewer registers, but they require more memory.	x86 processors require less memory, but more registers.
Execution is faster in ARM Processes.	Execution is slower in an x86 Processor.
ARM Processor work by generating multiple instructions from a complex instruction and they are executed separately.	x86 Processors work by executing complex statements at a single time.
ARM processors use the memory which is already available to them.	x86 processors require some extra memory for calculations.
ARM processors are deployed in mobiles which deal with the consumption of power, speed, and size.	x86 processors are deployed in Servers, Laptops where performance and stability matter.

Need for ARM Processor

Advantages of ARM Processor

•ARM processors deal with a single processor at a time, which makes it faster and it also consumes lesser power.

•ARM processors work in the case of a multiprogramming system, where more than one processor is used to process information.

•ARM processors are cheaper than other processors, which makes them usable in mobile phones.

•ARM processors are scalable, and this feature helps it in using a variety of devices.

Need for ARM Processor

Disadvantages of ARM Processor

•ARM processors are not stable with x86 processors, and due to this, they cannot be used in Windows Systems.

•ARM processors are not capable of very high performance, which limits them to a variety of applications.

•ARM processor execution is a little hard, which requires skilled programmers to use it.

•ARM processor is inefficient in handling Scheduling instructions.