Name:
Roll No.:

Aim :: **Case study on Multi-Core Processors**.

Theory:

What is Multi-core processor?

A multi-core processor is an integrated circuit (IC) to which two or more processors have been attached for enhanced performance, reduced power consumption, and more efficient simultaneous processing of multiple tasks. A dual core set-up is somewhat comparable to having multiple, separate processors installed in the same computer, but because the two processors are actually plugged into the same socket, the connection between them is faster.

The History And Evolution of Multi-core Processors::

        Computers and other technology originally began with single-core processors; in the early 2000s, Intel, AMD and several other manufacturers altered the history of computing forever by pushing multi core processors on the market.. Owners of smartphone's, modern-day TV's and PC's more than likely own a few multi-core processors without even realizing the presence of this technology.

        Over time, the multi-core processor evolved from dual core to tri, quad, hex and octa core designs (or processor chips with 2, 3, 4, 6, or 8 processors).

        Manufacturers now create CPUs with increasing design efficiency. Manufacturers now possess ILP (instruction-level parallelism) and TLP (thread level parallelism).

Multi-core processor benefits and trends::

        Multi-core processors can deliver significant performance benefits for multi-threaded software by adding processing power with minimal latency, given the proximity of the processors.
The most significant benefits will be seen in applications such as larger databases, CRM (customer relationship management), ERP (enterprise resource planning), ecommerce and virtualization.
The more threaded applications will clearly get more benefit. Over time, this trend is beginning to and will shape the future of software development towards parallel processing. In the meantime, target quad-core servers for those types of applications that can get the most out of them.
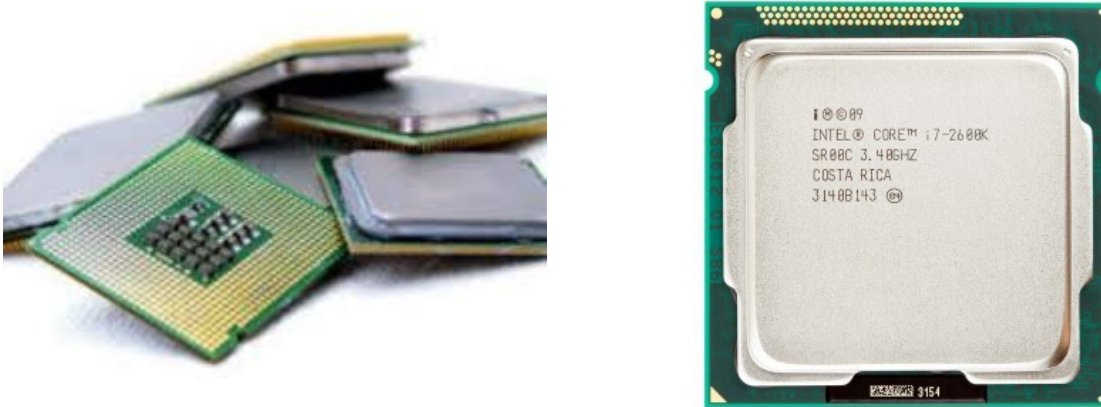
Fig-Multi-core Processors.

Characteristics to differentiate a processor::

A.
By using the following basic characteristics we can differentiate microprocessors:
1) Instruction set (ISA): The set of instructions that the microprocessor can execute.
2) Bandwidth: The number of bits processed in a single instruction.
3) Cores: number of cores varies depend on the type of processor, dual core contains 2 cores and quad core contains 4 cores, octa core contains 8 cores etc.

B. **Architecture**
Whether the processor has a 32-bit or 64-bit core determines the capability of the processor that run your software suitably or not.
The size of cache memory on die processor is also of importance, as this integrated memory space is used to hold the processor instructions before execution.
Finally, is the system a single, dual, quad or octa core processor?

C. **Clock Speed**
The clock speed of a computer processor determines the rate at which a processor executes instructions on data.
Though having a computer processor with a high clock speed is gainful, it alone is not the only factor that dictates overall system performance.

D. **Performance**
The largest boost in performance will likely be noticed in enhanced response time while running CPU-intensive processes like antivirus scans, ripping/burning media (requiring file conversion), or searching for files/folders.

Types::

Intel and AMD these multicore processors manufacturing companies are in top in the computer market.

1:Intel

Intel Core is a line of mid- to high-end consumer, workstation, and enthusiast central processing units (CPU) marketed by Intel Corporation.

Intel Core Duo::

Cache Latency In (Clock Cycle)::

CPU	Clock Frequency	L1 Cache	L2 Cache	L3 Cache
Core 2 Qaud	2.66 GHz	3 Cycles	15 Cycles	-
Core i7	2.66 GHz	4 Cycles	11 Cycles	39 Cycles

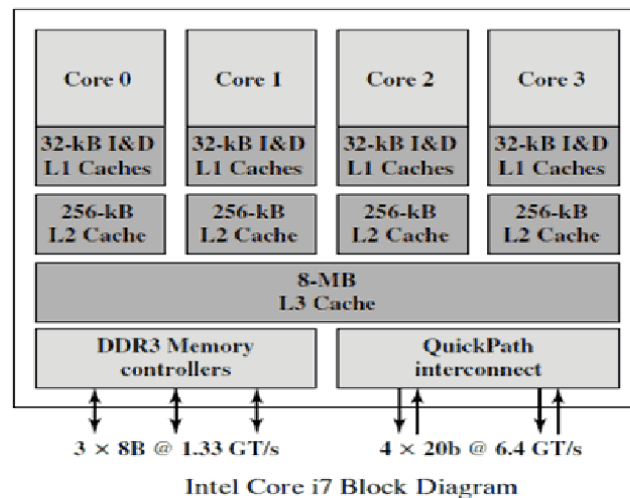Intel Core i7 Block Diagram

Fig::Intel Core I7 Block Diagram.

2::AMD

AMD is the second-largest supplier and only significant rival to Intel in the market for x86-based microprocessors. Since acquiring ATI in 2006, AMD and its competitor Nvidia have maintained a duopoly in the discrete Graphics Processing Unit (GPU) market.

3::ARM11 Mpcore processor::

The ARM 11 Mpcore is a multicore product based on the ARM11 Processor family. The ARM11 Mpcore can be configerdwith up to four processor , each with itc own L1 instruction and Data caches,per chip.

The key elements of system are as follows::

1: Distributed Interrupt Controller (DIC):: Handles interrupt detection and interrupt prioritization.The DIC distribute intrupt to indivisual processor .

2: Timer:: Each Cpu has itc own privte timer thatcan be generated interrupts.

3: Cpu Interface:: Handles interrupt acknowledgment, interrupt masking and interrupt completion acknowledgement.

4: Cpu:: A single AMR 11 procesor. Indivisual CPU's are refferd to as MP11 CPU's.

5: L1 Cache:: Each cpu has itc own dedicated L1 data cache and L1 instruction cache.

Conclusion: