Lecture 1

Introduction to Microprocessor

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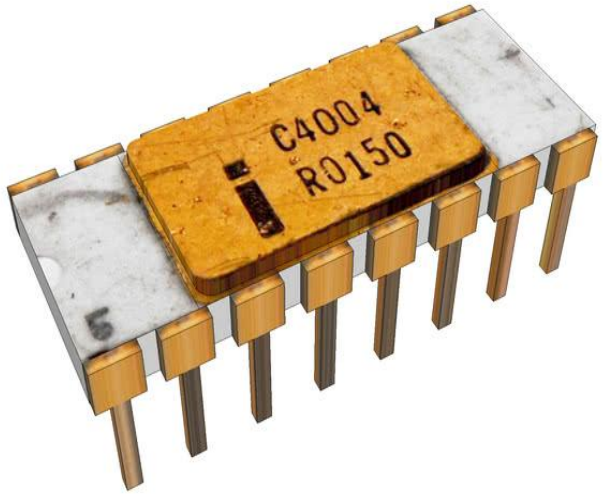
History

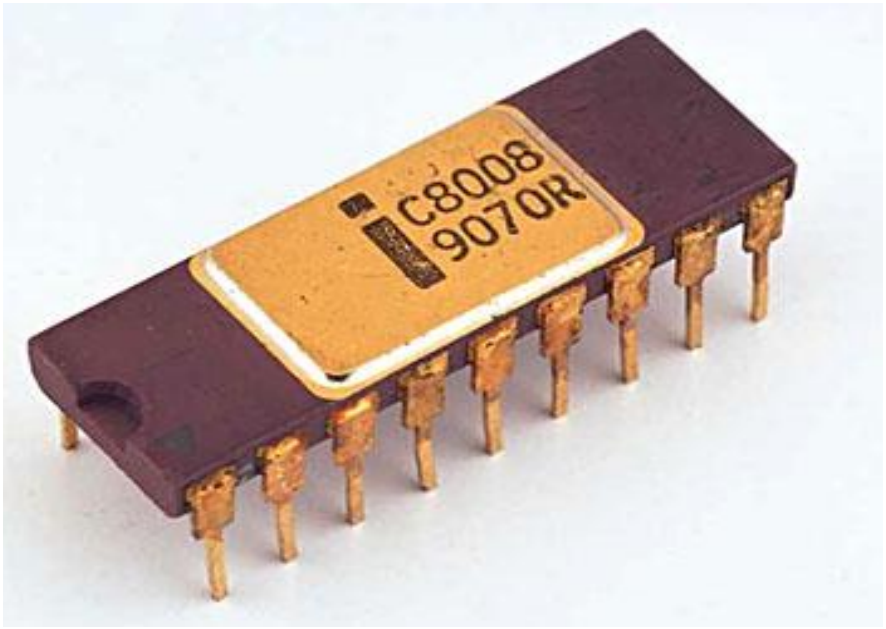
Intel 4004

- Introduced in 1971
- First microprocessor by Intel
- It was a 4-bit microprocessor
- Its clock speed was 740 KHz
- It had 2,300 transistors
- It could execute around 60,000 instructions per seconds
- Used in calculators



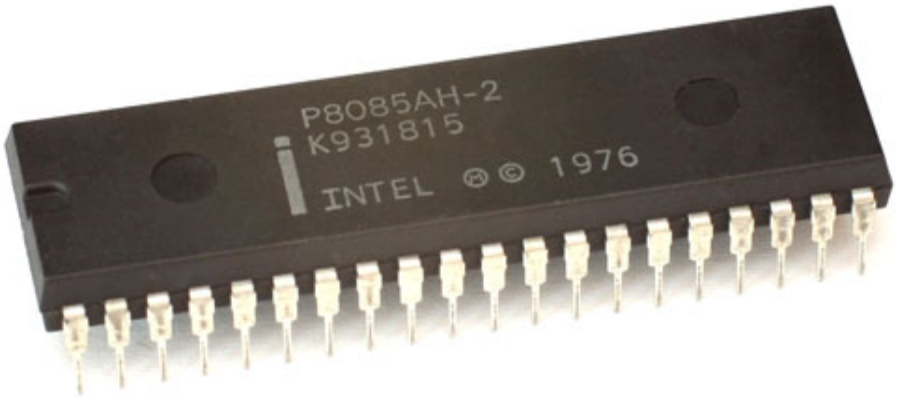
Intel 8008

- Introduced in 1972 it was first 8 bit microprocessor
- Its clock speed was 500 KHz
- Could execute 50,000 instruction per second
- Used in: Computer terminals, Calculator, Bottling Machines, industrial Robots



Intel 8080

- Introduced in 1974
- It was also 8-bit microprocessor
- Its clock speed was 2 MHz
- It has 6,000 transistors
- 10 times faster than 8008
- Could execute 500,000 instructions per second
- Used In: Calculators, Industrial Robots



Intel 8085

- Introduced in 1976
- It was also 8-bit microprocessor
- Its clock speed was 3 MHz ,+5v supply
- Its data bus is 8 bit and address bus is 16 bit
- It has 6,500 transistors
- It could execute 769,230 instructions per second
- It could access 64KB of memory
- It has 246 instructions
- Used In: early PC, On-Board Instrument Data Processors

Intel 8086

- Introduced in 1978
- First 16-bit microprocessor
- Clock speed is 5 to 10 MHz
- Data bus is 16-bit and address bus is 20-bit
- It had 29,000 transistors
- It could execute 2.5 million instructions per second
- Could access 1MB of memory
- It had 22,000 instructions
- Used In: CPU of Microcomputers

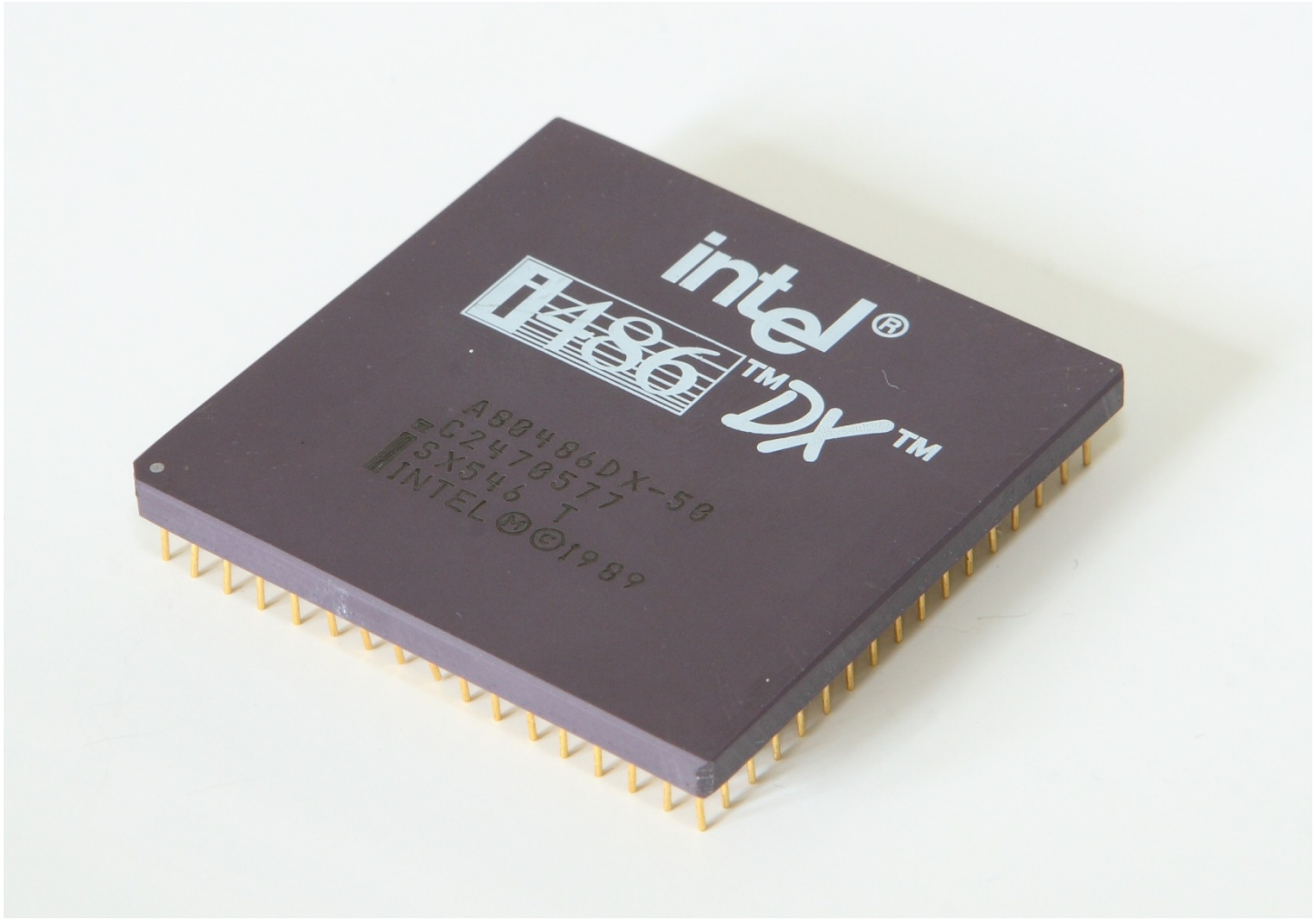
Intel 8088

- Introduced in 1979
- It was also 16-bit microprocessor
- It was creates as cheaper version of Intel's 8086
- 16-bit processor with an 8-bit data bus
- Could execute 2.5 million instructions per second
- The chip become the most popular in the computer industry when IBM used it for its first PC

Intel 80286

- Introduced in 1982
- It was 16-bit microprocessor
- Its clock speed was 8 MHz
- Data bus is 16-bit and address bus is 24-bit
- Could address 16 MB of memory
- It has 134,000 transistors
- Could execute 4-million instructions per second
- Multiuser and Multitasking

Intel 80286,386,486



Intel 80386

- Introduced in 1986
- First 32-bit microprocessor
- Data bus is 32 bit and address bus is 32-bit
- It could address 4GB of memory
- It has 275,000 transistors
- Clock speed varied from 16 MHz to 33 MHz depending upon different versions

Intel 80486

- Introduced in 1989
- 32-bit microprocessor
- Had 1.2 million transistors
- Clock speed varied from 16 MHz to 100 MHz depending upon the various versions
- 8KB of cache memory was introduced

Intel Pentium Series(32 -bit)

Pentium I

Introduced in 1993

It was also 32-bit microprocessor

Clock speed was 66 MHz

Data bus is 32-bit and address bus is 32-bit

Could address 4GB of memory

Pentium III

Introduced in 1999

It was 32-bit microprocessor

Clock speed varied from 500 MHz to 1.4 GHz

It had 9.5 million transistors

Pentium IV

Introduced in 2000

32-bit microprocessor

Clock speed was from 1.3 GHz to 3.8 GHz

Support SMT (Simultaneously Multithreading Technology)

Intel Core(64-bit)

Intel Core 2

- Introduced in 2006
- 64-bit microprocessor
- Clock speed is from 1.2 GHz to 3GHz

Intel Core i5

- Introduced in 2009
- It is a 64-bit microprocessor
- It has 4 physical cores
- Its clock speed is from 2.40 GHz to 3.60 GHz

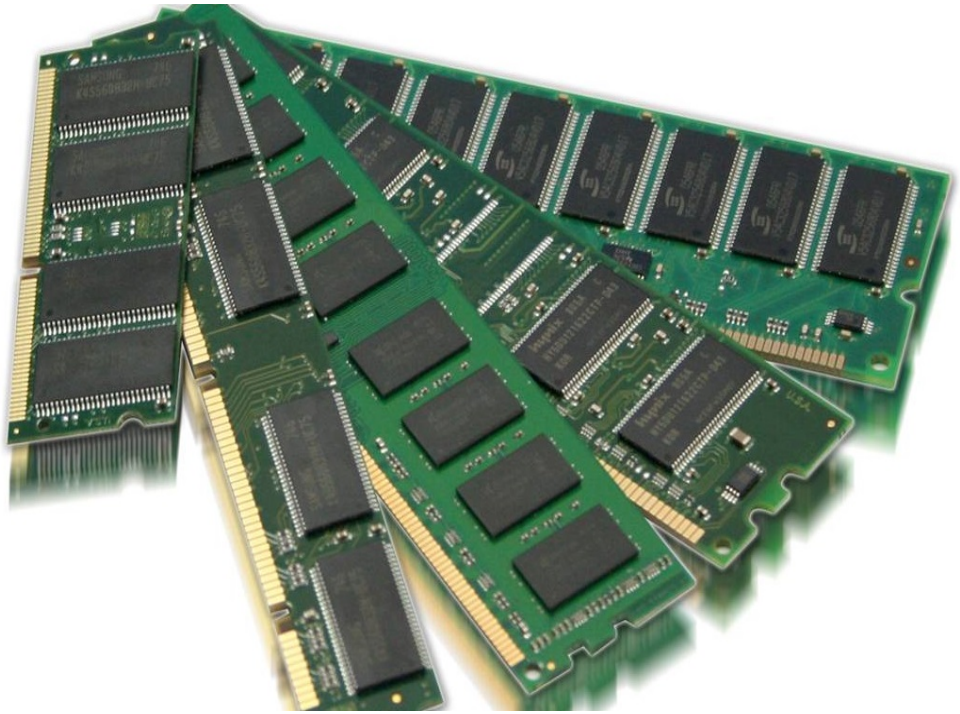
Cache Memory, RAM and Processor

What is a Cache?

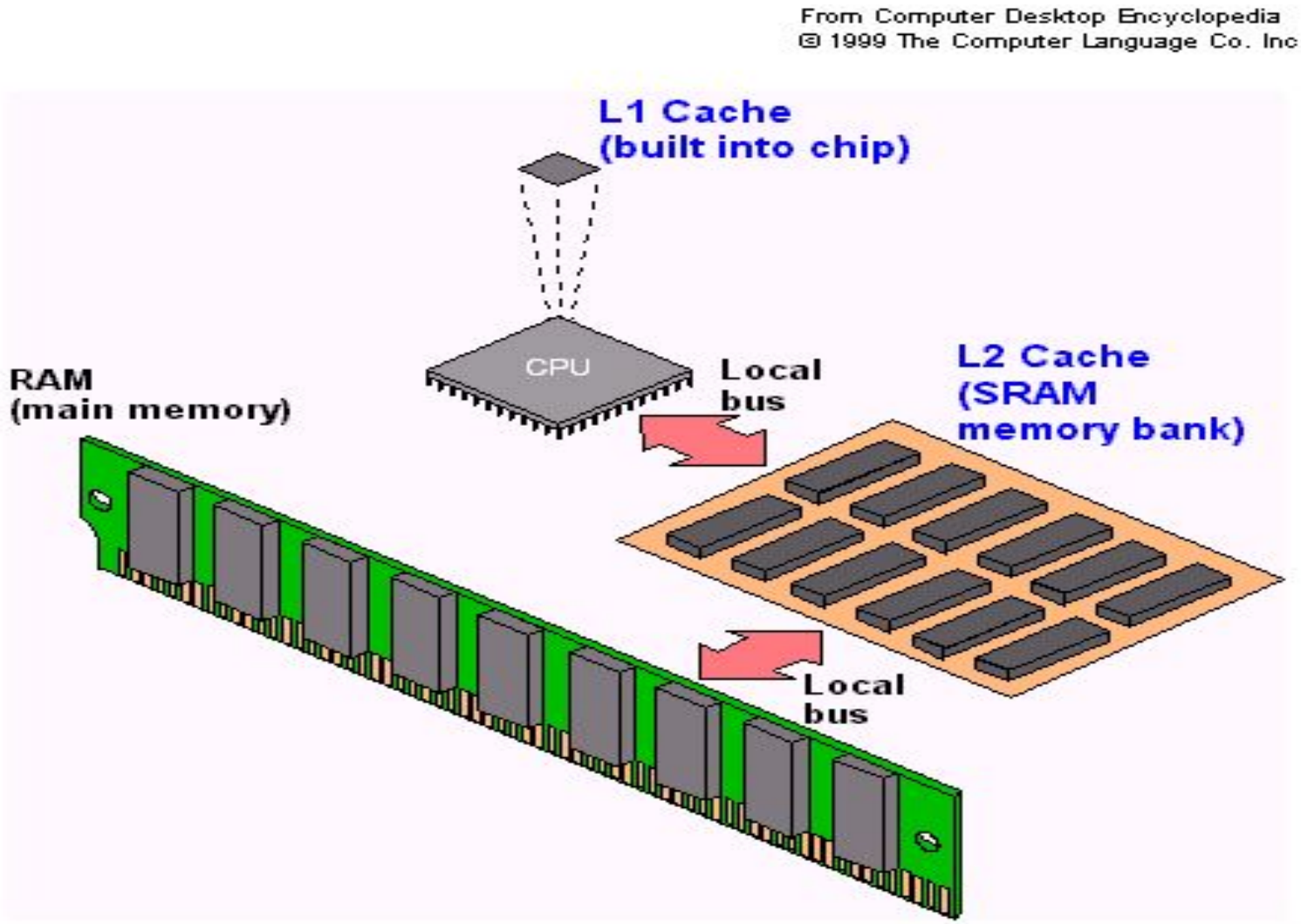
The cache is a very high speed, expensive piece of memory, which is used to speed up the memory retrieval process. Due to it's higher cost, the CPU comes with a relatively small amount of cache compared with the main memory. Without cache memory, every time the CPU requests for data, it would send the request to the main memory which would then be sent back across the system bus to the CPU. This is a slow process. The idea of introducing cache is that this extremely fast memory would store data that is frequently accessed and if possible, the data that is around it. This is to achieve the quickest possible response time to the CPU.

Random Access Memory

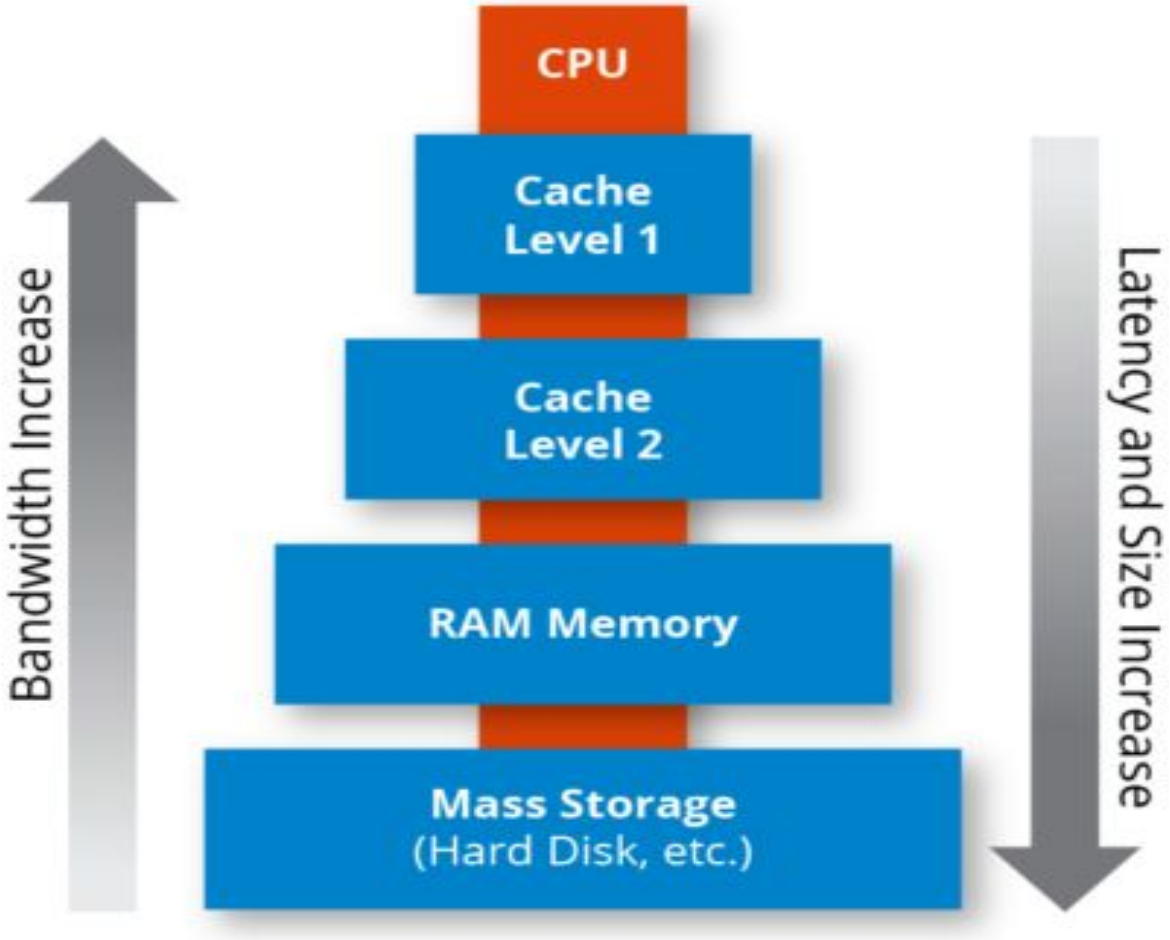
- Main Memory(RAM) is quite slow
- Average RAM Module is 200 MHz Average CPU's are clocked at 1.2-1.5GHz
- Hence in order to communicate with RAM the CPU takes a lot of time.
- Almost 10 times slower than CPU
- Therefore the performance is affected.



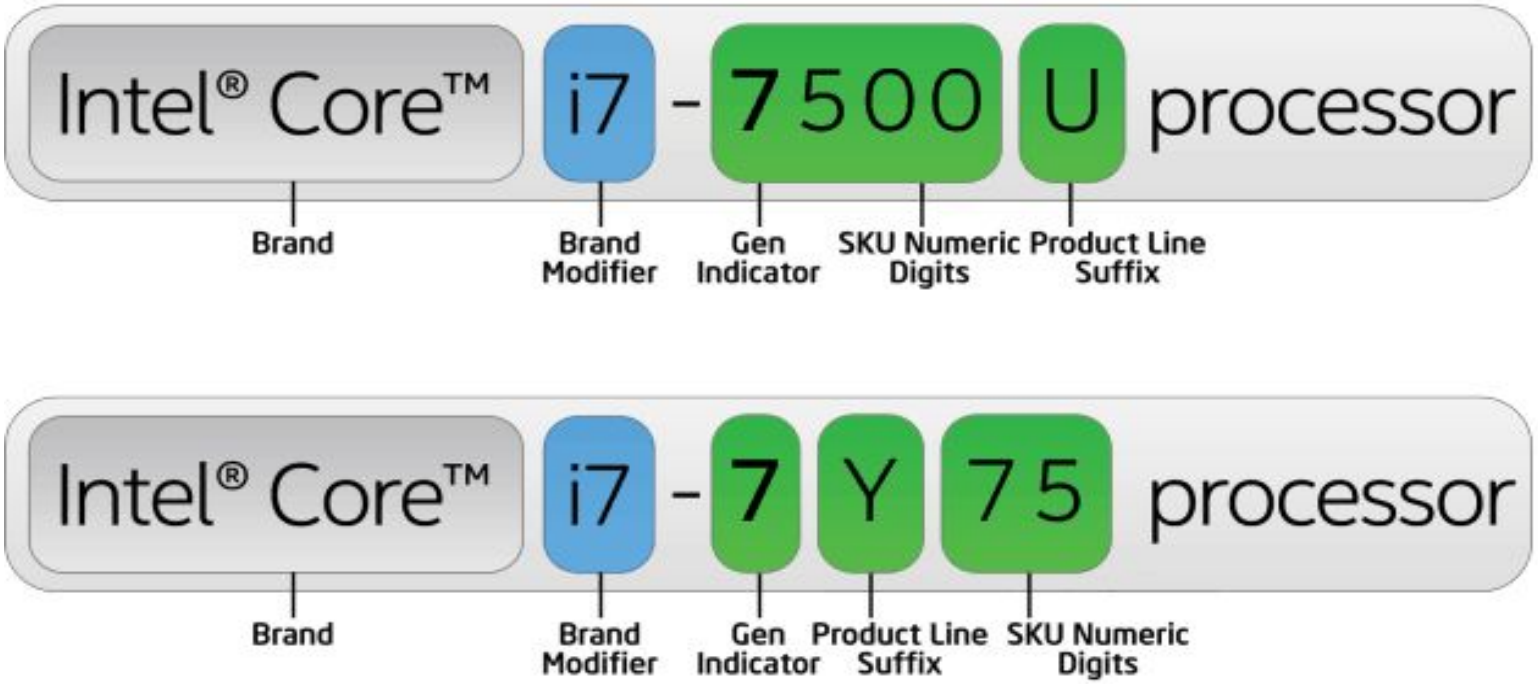
Working of Cache, RAM and CPU



Memory Pyramid



Codes and Numbers



Processor Comparison

32-bit

- 2^32 = 4GB RAM
- Requires more time to process and response relatively.
- Cheaper
- Used as personal computer and run office tasks

64-bit

- 2^64 = 16 Exabyte RAM

(that's 4 billion times more memory than 32 bit)

- Requires less time to process and response
- Expensive
- Also used as personal computer along with audio/video editing and server application

Any Queries?

Thank you