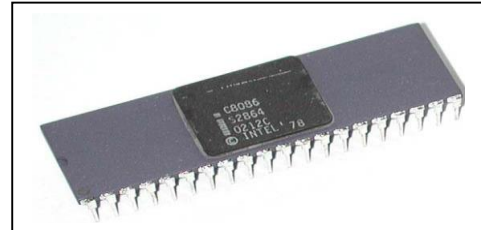# Introduction to microprocessor

8086/8088 microprocessor

The brain or engine of the PC is the *processor* (sometimes called *microprocessor*), or *central processing unit (CPU)*. The CPU performs the system's calculating and processing. The processor is often the most expensive single component in the system .8086 It is a 16 bit µP (16-bit data bus). It has a 20 bit address bus can access 2^{20} bytes memory locations (1 MB).

Why is intel 8086 known as 16 bit microprocessor?

8086 processor is capable to process the 16 bit data together. means a data with 16 bit can be processed and can be send to processor in single oscillation . Therefore the data sended can be more rich and and briefed.

For example : consider a latest generation processor i3 5th gen with 2.1 with 64 bit processing power

will generate 2.1e+6 Hz for which 64 bit can be processed for every single oscillation generated by the clock.

Evolution of microprocessor

Transistor was invented in 1948 (23 December 1947 in Bell lab). IC was invented in 1958 (Fair Child Semiconductors) By Texas Instruments J kilby. First microprocessor was invented by INTEL(INTegrated ELectronics).

Size of microprocessor − 4 bit

NAME	YEAR OF INVENTION	CLOCK SPEED	NUMBER OF TRANSISTORS	INST. PER SEC
INTEL 4004/4040	1971 by Ted Hoff and Stanley Mazor	740 KHz	2300	60,000

Size of microprocessor – 8 bit

NAME	YEAR OF INVENTION	CLOCK SPEED	NUMBER OF TRANSISTORS	INST. PER SEC
8008	1972	500 KHz		50,000
8080	1974	2 MHz	60,000	10 times faster than 8008
8085	1976 (16 bit address bus)	3 MHz	6500	769230

Size of microprocessor – 16 bit

NAME	YEAR OF INVENTION	CLOCK SPEED	NUMBER OF TRANSISTORS	INST. PER SEC
8086	1978 (multiply and divide instruction, 16 bit data bus and 20 bit address bus)	4.77 MHz, 8 MHz, 10 MHz	29000	2.5 Million
8088	1979 (cheaper version of 8086 and 8 bit external bus)			2.5 Million
80186/80188	1982 (80188 cheaper version of 80186, and addtional components like interuppt controller, clock generator, local bus controller,counters)	6 MHz		
80286	1982 (data bus 16bit and address bus 24 bit)	8 MHz	134000	4 Million

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Size of microprocessor – 32 bit

NAME	YEAR OF INVENTION	CLOCK SPEED	NUMBER OF TRANSISTORS	INST. PER SEC
INTEL 80386	1986 (other versions 80386DX, 80386SX, 80386SL and data bus 32 bit address bus 32 bit)	16 MHz – 33 MHz	275000	
INTEL 80486	1986 (other versions 80486DX, 80486SX, 80486DX2, 80486DX4)	16 MHz – 100 MHz	1.2 Million transistors	8 KB of cache memory
PENTIUM	1993	66 MHz		Cache memory 8 bit for instructions 8 bit for data

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Size of microprocessor – 64 bit

NAME	YEAR OF INVENTION	CLOCK SPEED	NUMBER OF TRANSISTORS	INST. PER SEC
INTEL core 2	2006 (other versions core2 duo, core2 quad, core2 extreme)	1.2 GHz to 3 GHz	291 Million transistors	64 KB of L1 cache per core 4 MB of L2 cache
i3, i5, i7	2007, 2009, 2010	2.2GHz – 3.3GHz, 2.4GHz – 3.6GHz, 2.93GHz – 3.33GHz		

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Generations of microprocessor

1. **First generation :**
   From 1971 to 1972 the era of the first generation came which brought microprocessors like INTEL 4004 Rockwell international PPS-4 INTEL 8008 etc.

2. **Second generation :**
   The second generation marked the development of 8 bit microprocessors from 1973 to 1978. Processors like INTEL 8085 Motorola 6800 and 6801 etc came into existence.

3. **Third generation :**
   The third generation brought forward the 16 bit processors like INTEL 8086/80186/80286 Motorola 68000 68010 etc. From 1979 to 1980 this generation used the HMOS technology.

4. **Fourth generation :**
   The fourth generation came into existence from 1981 to 1995. The 32 bit processors using HMOS fabrication came into existence. INTEL 80386 and Mororola 68020 are some of the popular processors of this generation.

5. **Fifth generation ;**
   From 1995 till now we are in the fifth generation. 64 bit processors like PENTIUM, celeron, dual, quad and octa core processors came into existence.