

Intel 8088

Intel 8088

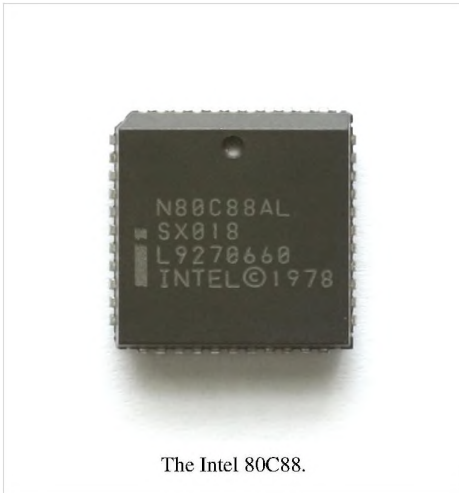


An Intel 8088 microprocessor

Produced	From 1979 to 1990s
Designed by	Intel
Common manufacturer(s)	<ul style="list-style-type: none">• Intel• AMD• NEC• Fujitsu• Harris (Intersil)
Max. CPU clock rate	5 MHz to 10 MHz
FSB speeds	5 MHz to 10 MHz
Min. feature size	3µm
Instruction set	x86 (IA-16)
Microarchitecture	8088
Cores	1
L1 cache	Motherboard dependent
L2 cache	none
Application	Desktop, Embedded
Predecessor	(8080)
Successor	80188
Package(s)	<ul style="list-style-type: none">• 40-pin DIP• 44-pin PLCC
Variant	8086

The **Intel 8088** microprocessor was a variant of the Intel 8086 and was introduced on July 1, 1979. It had an 8-bit external data bus instead of the 16-bit bus of the 8086. The 16-bit registers and the one megabyte address range were unchanged, however. The original IBM PC was based on the 8088.

History and description



The 8088 was targeted at economical systems by allowing the use of an 8-bit data path and 8-bit support and peripheral chips; complex circuit boards were still fairly cumbersome and expensive when it was released. The prefetch queue of the 8088 was shortened to four bytes, from the 8086's six bytes, and the prefetch algorithm was slightly modified to adapt to the narrower bus. These modifications of the basic 8086 design were one of the first jobs assigned to Intel's then new design office and laboratory in Haifa, Israel.

Variants of the 8088 with more than 5 MHz maximum clock frequency include the 8088-2, which was fabricated using Intel's new enhanced nMOS process called HMOS and specified for a maximum frequency of 8 MHz. Later followed the 80C88, a fully static CHMOS design, which could operate from DC to 8 MHz. There were also several other,

more or less similar, variants from other manufacturers. For instance, the NEC V20 was a pin compatible and slightly faster (at the same clock frequency) variant of the 8088, designed and manufactured by NEC. Successive NEC 8088 compatible processors would run at up to 16 MHz.

When announced the list price on the 8088 was US \$124.80.^[1]

Performance

Depending on the clock frequency, the number of memory wait states, as well as on the characteristics of the particular application program, the *average* performance for the Intel 8088 ranged from approximately 0.33–1 million instructions per second.^[2] Meanwhile, the `mov reg,reg` and `ALU[3] reg,reg` instructions taking two and three cycles respectively yielded an *absolute peak* performance of between 1/3 and 1/2 MIPS per MHz, that is, somewhere in the range 3–5 MIPS at 10 MHz.

Selection for use in the IBM PC

The original IBM PC was the most influential microcomputer to use the 8088. It used a clock frequency of 4.77 MHz (4/3 the NTSC colorburst frequency). Some of IBM's engineers and other employees wanted to use the IBM 801 processor, some would prefer the new Motorola 68000,^[4] while others argued for a small and simple microprocessor similar to that which had been used in earlier personal computers (such as the TRS-80 or Apple II). However, IBM already had a history of using Intel chips in its products and had also acquired the rights to manufacture the 8086 family.^[5] Another factor was that the 8088 allowed the computer to be based on a modified 8085 design, as it could easily interface with most nMOS chips with 8-bit databuses, i.e. existing and mature, and therefore economical, components. This included ICs originally intended for support and peripheral functions around the 8085 and similar processors (not exclusively Intels) which were already well known by many engineers, further reducing cost.^[6]

The descendants of the 8088 include the 80188, 80186, 80286, 80386, and later software compatible processors, which are in use today. See below for a more complete list.

Notes and references

- [1] "Intel Brings Out 8-Bit MPU featuring 16-Bit Architecture" (http://books.google.ca/books?id=ouiYCe_Xw20C&pg=PA71&dq=Intel+8088++architecture&hl=en&ei=uSHMTuujM4rIhAfulK3bDQ&sa=X&oi=book_result&ct=result&redir_esc=y#v=onepage&q=Intel+8088+architecture&f=false). *Computerworld*. 14 May 1979. p. 71. . Retrieved 21 November 2011.
- [2] <http://www.olympusmicro.com/micd/galleries/chips/intel8088a.html>
- [3] ALU stands for one of the instructions add, adc, sub, sbc, cmp, and, or, xor.
- [4] Later used for the IBM Instruments Laboratory Computer
- [5] In exchange for giving Intel the rights to its bubble memory designs. However, due to fierce competition from Japanese manufacturers who were able to undercut by cost, Intel soon left this market and changed focus to microprocessors.
- [6] 68000 components were not widely available at the time, though it could use Motorola 6800 components to an extent.

External links

- Intel Datasheet (<http://datasheets.chipdb.org/Intel/x86/808x/datashts/8088>)
-