8-bit

In computer architecture, **8-bit** integers, memory addresses, or other data units are those that are 8 bits (1 octet) wide. Also, 8-bit CPU and ALU architectures are those that are based on registers, address buses, or data buses of that size. **8-bit** is also a generation of microcomputers in which 8-bit microprocessors were the norm.

The IBM System/360 introduced byte-addressable memory with 8-bit bytes, as opposed to bit-addressable or decimal digit-addressable or word-addressable memory, although its general purpose registers were 32 bits wide, and addresses were contained in the lower 24 bits of those addresses. Different models of System/360 had different internal data path widths; the IBM System/360 Model 30 (1965) implemented the 32-bit System/360 architecture, but had an 8 bit native path width, and performed 32-bit arithmetic 8 bits at a time.[1]

The first widely adopted 8-bit microprocessor was the Intel 8080, being used in many hobbyist computers of the late 1970s and early 1980s, often running the CP/M operating system; it had 8-bit data words and 16-bit addresses. The Zilog Z80 (compatible with the 8080) and the Motorola 6800 were also used in similar computers. The Z80 and the MOS Technology 6502 8-bit CPUs were widely used in home computers and second- and third-generation game consoles of the 1970s and 1980s. Many 8-bit CPUs or microcontrollers are the basis of today's ubiquitous embedded systems.

Details

There are 2^8 (256) different possible values for 8 bits. When unsigned, it has possible values ranging from 0 to 255, when signed, it has -128 to 127.

Eight-bit CPUs use an 8-bit data bus and can therefore access 8 bits of data in a single machine instruction. The address bus is typically a double octet wide (i.e. 16-bit), due to practical and economical considerations. This implies a direct address space of only 64 kB on most 8-bit processors.

Notable 8-bit CPUs

The first commercial 8-bit processor was the Intel 8008 (1972) which was originally intended for the Datapoint 2200 intelligent terminal. Most competitors to Intel started off with such character oriented 8-bit microprocessors. Modernized variants of these 8-bit machines are still one of the most common types of processor in embedded systems.

Another notable 8-bit CPU is the MOS Technology 6502; it, and variants of it, were used in a number of personal computers such as the Apple I and Apple II, the Atari 8-bit family, the BBC Micro, and the Commodore PET and Commodore VIC-20, and in a number of video game consoles such as the Atari 2600 and the Nintendo Entertainment System.

Early or popular 8-bit processors (incomplete)

Manufacturer	Processor	Year	Comment
Intel	8008	1972	Datapoint 2200 compatible
Signetics	2650	1973	
Intel	8080	1974	8008 source compatible
Motorola	6800	1974	
Fairchild	F8	1975	
MOS	6502	1975	Similar to 6800, but incompatible
Microchip	PIC	1975	Harvard architecture microcontroller
Electronic Arrays	EA9002	1976	8-bit data, 12-bit addressing
RCA	1802	1976	
Zilog	Z80	1976	8080 binary compatible
Intel	8085	1977	8080 binary compatible
Motorola	6809	1978	6800 source compatible
Zilog	Z8	1978	Harvard architecture microcontroller
Intel	8051	1980	Harvard architecture microcontroller
MOS	6510	1982	Enhanced 6502 custom-made for use in the Commodore 64
Ricoh	2A03	1982	6502 clone minus BCD instructions for the Nintendo Entertainment System
Zilog	Z180	1985	Z80 binary compatible
Motorola	68HC11	1985	
Atmel	AVR	1996	
Zilog	EZ80	1999	Z80 binary compatible
Infineon	XC800	2005	
Freescale	68HC08		
Hudson	HuC6280		
Motorola	6803		
NEC	78K0[2]		

References

1. Amdahl, G. M.; Blaauw, G. A.; Brooks, F. P. (1964). "Architecture of the IBM System/360" *IBM Journal of Research and Development* **8** (2): 87–101. doi:10.1147/rd.82.0087 (https://doi.org/10.1147%2Frd.82.0087)
2. "NEC 78K0" (https://web.archive.org/web/20081028210428/http://www.am.necel.com/micro/product/all_8_general.html/). Archived from the original (http://www.am.necel.com/micro/product/all_8_general.html/) on 2008-10-28. Retrieved 2009-02-10.