24-bit

In computer architecture, **24-bit** integers, memory addresses, or other data units are those that are 24 bits (3 octets) wide. Also, 24-bit CPU and ALU architectures are those that are based on registers, address buses, or data buses of that size.

Notable **24-bit** machines include the CDC 924 – a 24-bit version of the CDC 1604, CDC lower 3000 series, SDS 930 and SDS 940, the ICT 1900 series, and the Datacraft minicomputers, Harris H series.[1]

The term SWORD is sometimes used to describe a 24-bit data type with the S prefix referring to sesqui.

The IBM System/360, announced in 1964, was a popular computer system with 24-bit addressing and 32-bit general registers and arithmetic. The early 1980s saw the first popular personal computers, including the IBM PC/AT with an Intel 80286 processor using 24-bit addressing and 16-bit general registers and arithmetic, and the Apple Macintosh 128K with a Motorola 68000 processor featuring 24-bit addressing and 32-bit registers.

The eZ80 is a microprocessor and microcontroller family, with 24-bit registers and therefore 24-bit linear addressing, that is binary compatible with the 8/16-bit Z80.

The 65816 is a microprocessor and microcontroller family with 16-bit registers and 24-bit bank switched addressing. It is binary compatible with the 8-bit 6502.[2]

The range of unsigned integers that can be represented in 24 bits is 0 to 16,777,215 ($FFFFFF_{16}$ in hexadecimal). The range of signed integers that can be represented in 24 bits is −8,388,608 to 8,388,607.

Several fixed-point digital signal processors have a 24-bit data bus, selected as the basic word length because it gave the system a reasonable precision for the processing audio (sound). In particular, the Motorola 56000 series has three parallel 24-bit data buses, one connected to each memory space: program memory, data memory X, and data memory Y.[3]

Engineering Research Associates (later merged into UNIVAC) designed a series of 24-bit drum memory machines including the Atlas, its commercial version the UNIVAC 1101, the ATHENA computer, the UNIVAC 1824 guidance computer, etc. Those designers selected a 24-bit word length because the Earth is roughly 40 million feet in diameter, and an intercontinental ballistic missile guidance computer needs to do the Earth-centered inertial navigation calculations to an accuracy of a few feet.[4]

See also

- Catena, a term used for a 24-bit unit of data on the Bull Gamma 60 computer

References

1. Savard, John. "Real Machines with 24-bit and 48-bit words" (http://www.quadibloc.com/comp/cp0303.htm). Archived (https://web.archive.org/web/20110107183451/http://quadibloc.com/comp/cp0303.html) from the original on 7 January 2011. Retrieved 2011-02-11.
2. Brett Tabke. "A 6502 Programmer's Introduction to the 65816" (http://www.defence-force.org/computing/oric/coding/annexe_2/). Commodore World magazine, Issue #16. 1996.
3. 24-BIT. DIGITAL SIGNAL PROCESSOR. FAMILY (http://cache.freescale.com/files/dsp/doc/inactive/DSP56000UM.pdf)
4. "UNIVAC 24-bit computer genealogy" (http://vipclubmn.org/CP24bit.html)