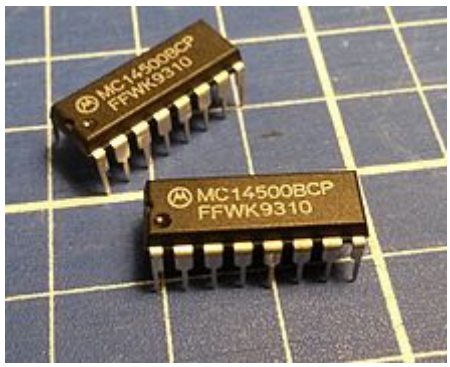
1-bit architecture

A **1-bit** computer architecture is an instruction set architecture for a processor that has datapath widths and data register widths of 1 bit (1/8 octet) wide.



1-bit microprocessor MC14500BCP

An example of a 1-bit computer built from discrete logic SSI chips[1][2] were the Wang 700 (1968/1970)[3] and Wang 500 (1970/1971)[4] calculator as well as the Wang 1200 (1971/1972)[5] word processor series of Wang Laboratories.

An example of a 1-bit architecture that was actually marketed as a CPU is the Motorola MC14500B Industrial Control Unit (ICU),[6][7] introduced in 1977 and manufactured at least up into the mid 1990s.[7] One of the computers known to be based on this CPU was the WDR 1-bit computer.[8] A typical sequence of instructions from a program for a 1-bit architecture might be:

- load digital input 1 into a 1-bit register;
- OR the value in the 1-bit register with input 2, leaving the result in the register;
- write the value in the 1-bit register to output 1.

This architecture was considered superior for programs making decisions rather than performing arithmetic computations, for ladder logic as well as for serial data processing.[6]

There are also several design studies for 1-bit architectures in academia, and corresponding 1-bit logic can also be found in programming.

Other examples of 1-bit architectures are programmable logic controllers (PLCs), programmed in instruction list (IL).

Several early massively parallel computers used 1-bit architectures for the processors as well. Examples include the Goodyear MPP and the Connection Machine. By using a 1-bit architecture for the individual processors a very large array (e.g.: the Connection Machine had 65,536 processors) could be constructed with the chip technology available at the time. In this case the slow computation of a 1-bit processor was traded off against the large number of processors.

1-bit CPUs can meanwhile be considered obsolete, not many kinds have been produced and none are known to be available in the major computer component stores (as of 2018, a few are found on eBay[9]). The Finnish company Partco offered MC14500B as spare part in 2017.[10]

Contents

See also

- Bit-serial architecture
- Bit slicing
- Turing machine

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