Address Register Encyclopedia Article

Address Register

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Contents

Address Register Encyclopedia Article.....1

Contents.....2

Address Register.....3

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Any computer **memory** unit may be idealized as (because it *behaves* as) a large collection of registers, each of which holds a single binary word N bits in length. Only one of these registers is connected to the outside world (i.e., the rest of the computer) at any given moment. While a **register** is so connected, its contents may either be read out or written over. All the vast, high-speed information flows to and from memory that computer users take for granted consist of this simple procedure repeated millions of times per second.

The binary **string** that tells a memory unit *which* internal register to connect to the "outside world" is the *address* of that location. A register that contains such an address and communicates it to the memory is an *address register*. Since memories of several sorts appear throughout any computer--from scratchpad memory in the **central processing unit**, to random-access memory chips, to peripheral bulk-storage devices such as disk drives and CD-ROMs--any given computer contains many address registers, all serving the same basic function for their respective memories.

Since a memory containing (say) 2^M words of **data** requires 2^M distinct addresses, an M-bit address register is required for addressing the data such a memory. Or to put it the other way around, an M-bit address suffices for addressing a memory containing not more than (but possibly less than) 2^M distinct data items.