RISC vs CISC

- **https://cs.stanford.edu/people/eroberts/courses/soco/projects/risc/risccisc/**

CISC	RISC
Emphasis on hardware	Emphasis on software
Includes multi-clock complex instructions	Single-clock, reduced instruction only
Memory-to-memory: "LOAD" and "STORE" incorporated in instructions	Register to register: "LOAD" and "STORE" are independent instructions
Small code sizes, high cycles per second	Low cycles per second, large code sizes
Transistors used for storing complex instructions	Spends more transistors on memory registers

However, the RISC strategy also brings some very important advantages. Because each instruction requires only one clock cycle to execute, the entire program will execute in approximately the same amount of time as the multi-cycle "MULT" command. These RISC "reduced instructions" require less transistors of hardware space than the complex instructions, leaving more room for general purpose registers. Because all of the instructions execute in a uniform amount of time (i.e. one clock), pipelining is possible.

Separating the "LOAD" and "STORE" instructions actually reduces the amount of work that the computer must perform. After a CISC-style "MULT" command is executed, the processor automatically erases the registers. If one of the operands needs to be used for another computation, the processor must re-load the data from the memory bank into a register. In RISC, the operand will remain in the register until another value is loaded in its place.

RISC Roadblocks

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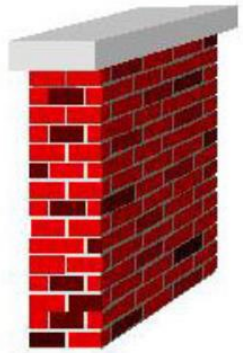
Despite the advantages of RISC based processing, RISC chips took over a decade to gain a foothold in the commercial world. This was largely due to a lack of software support.

Although Apple's Power Macintosh line featured RISC-based chips and Windows NT was RISC compatible, Windows 3.1 and Windows 95 were designed with CISC processors in mind. Many companies were unwilling to take a chance with the emerging RISC technology. Without commercial interest, processor developers were unable to manufacture RISC chips in large enough volumes to make their price competitive.



Another major setback was the presence of Intel. Although their CISC chips were becoming increasingly unwieldy and difficult to develop, Intel had the resources to plow through development and produce powerful processors. Although RISC chips might surpass Intel's efforts in specific areas, the differences were not great enough to persuade buyers to change technologies.

The Overall RISC Advantage
Today, the Intel x86 is arguable the only chip which retains CISC architecture. This is primarily due to advancements in other areas of computer technology. The price of RAM has decreased dramatically. In 1977, 1MB of DRAM cost about $5,000. By 1994, the same amount of memory cost only $6 (when adjusted for inflation). Compiler technology has also become more sophisticated, so that the RISC use of RAM and emphasis on software has become ideal.

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