



RISC Vs CISC



CISC

- A Computer with large number of instructions is classified as a Complex Instruction Set Computer
- **Design consideration for Instruction set:**
 - Machine Language Constructs
 - To simplify the compilation
 - The essential goal of CISC Architecture is to attempt to provide a single machine instruction for each statement that is written in high level language.



Characteristics of CISC Architecture

- Large number of instructions in the Instruction set; 100 to 250.
- Instructions are quite complex and detailed; needs more hardware which may slow down the processing.
- Some Instructions perform specialized tasks and are not used frequently.
- A large variety of Addressing Modes typically from 5-20.
- Variable length Instruction formats.
- It has instructions which manipulates operands in memory.



Limitation of CISC

1. Optimization the generated code and enhancement of pipelining is difficult with complex instructions set computers.
2. Longer opcodes, larger addressing modes, thereby larger size of instruction and complex control unit , and increased execution time of the instruction.
3. Design of the cost is high.

Thus, it is not clear that by increasing the complexity of the instruction set , one have higher overall efficiency.



Six Principles of RISC Philosophy

- Reliance on optimizing Compilers
- Few Instructions and Addressing modes
- Fixed instruction formats
- Instruction execution in one machine cycle
- Only call and return instructions access memory
- Hardwired control



Characteristics of RISCs

- 1) Instructions are simple.
- 2) Only a few instructions.
- 3) Instructions are of uniform length.
- 4) One of few instruction formats.
- 5) Few addressing modes.
- 6) **LOAD** and **STORE** only references the memory.
- 7) All operations are done on the registers of the CPU.
- 8) Few data types typically integer and floating point.
- 9) All machine cycle execute in one clock state, and machine instructions are hardwired.
- 10) Large register set.
- 11) Strong pipelining.



Benefits

1. Improved performance due to simple and faster execution of instructions, simple compilers.
 2. Effective pipelining, parallelism in CU.
 3. More responsive to interrupts, since interrupts are checked between elementary operations.
 4. Only 6 % of VLSI area is Control Unit , against 50 % for CISC
 5. Design implementation time for VLSI is far less in RISCs.
- * More recently RISC and CISC approaches are coming together and have features of each other.



Examples of RISC

- 1) Motorola 88000
- 2) Sun SPARC
- 3) Intel 860/960

* RISC typically have been in applications area like work stations, high performance, and low cost lab machine.

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