Influence on Instruction sets

In instruction is a set of codes that the computer processor can understand. The code is usually in 1s and 0s, or machine language. It contains instructions or tasks that control the movement of bits and bytes within the processor.

Example of some instruction sets −

- **ADD** − Add two numbers together.
- **JUMP** − Jump to designated RAM address.
- **LOAD** − Load information from RAM to the CPU.

Types of Instruction Set

Generally, there are two types of instruction set used in computers.

Reduced Instruction set Computer (RISC)

A number of computer designers recommended that computers use fewer instructions with simple constructs so that they can be executed much faster within the CPU without having to use memory as often. This type of computer is called a Reduced Instruction Set Computer.

The concept of RISC involves an attempt to reduce execution time by simplifying the instruction set of computers.

Characteristics of RISC

The characteristics of RISC are as follows −

- Relatively few instructions.
- Relatively few addressing modes.
- Memory access limited to load and store instructions.
- All operations done within the register of the CPU.
- Single-cycle instruction execution.
- Fixed length, easily decoded instruction format.
- Hardwired rather than micro programmed control.

A characteristic of RISC processors' ability is to execute one instruction per clock cycle. This is done by overlapping the fetch, decode and execute phases of two or three instructions by using a procedure referred as pipelining.

Complex Instruction Set Computer (CISC)

CISC is a computer where a single instruction can perform numerous low-level operations like a load from memory and a store from memory, etc. The CISC attempts to minimize the number of instructions per program but at the cost of an increase in the number of cycles per instruction.

The design of an instruction set for a computer must take into consideration not only machine language constructs but also the requirements imposed on the use of high level programming languages.

The goal of CISC is to attempt to provide a single machine instruction for each statement that is written in a high level language.

Characteristics of CISC

The characteristics of CISC are as follows −

- A large number of instructions typically from 100 to 250 instructions.
- Some instructions that perform specialized tasks and are used infrequently.
- A large variety of addressing modes- typically from 5 to 20 different modes.
- Variable length instruction formats.
- Instructions that manipulate operands in memory.

Example

For performing an ADD operation, CISC will execute a single ADD command which will execute all the required load and store operations.

RISC will execute each operation for loading data from memory, adding values and storing data back to memory using different low-level instructions.