

Introduction to CISC and RISC Architecture

Hardware designers invent numerous technologies & tools to implement the desired architecture in order to fulfill the needs. Hardware architecture may be implemented to be either hardware specific or software specific, but according to the application both are used in required quantity.

As far as the Processor hardware is concerned, there are two types of concepts to implement the Processor hardware architecture. The first one is RISC and other is CISC.

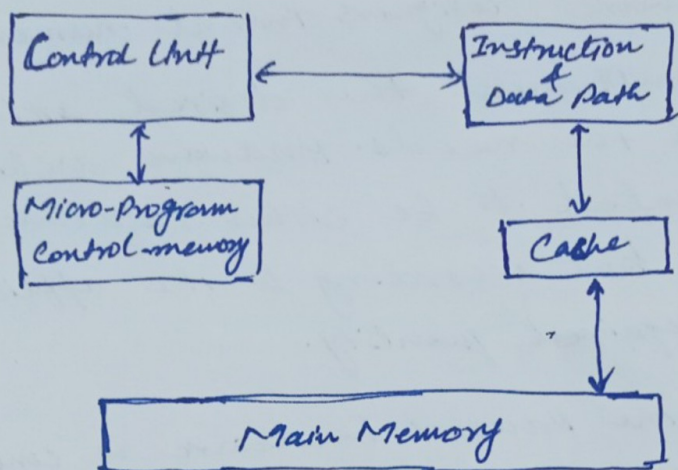
CISC (Complex Instruction Set Computer) has the ability to execute multistep operations within one instruction set. It is design of the CPU where one instruction performs many low level operations. For example, memory storage, arithmetic operation and loading from memory.

RISC (Reduced Instruction Set Computer) architecture have simple collection and highly optimized set of instructions. It is built to minimize the instruction execution time by optimizing and limiting the number of instructions.

Both approaches try to increase the CPU performance

- RISC reduces the cycles per instructions at the cost of the number of instructions per Program.
- CISC approach attempts to minimize the number of instructions per Program but at the cost of increase in number of cycles per instruction.

CISC Architecture:



The CISC approach attempts to minimize the number of instructions per program, sacrificing the number of cycles per instruction. Computers based on the CISC architecture are designed to decrease the memory cost. Because, the large programs need more storage, thus, increasing the memory cost. To solve these problems, the number of instructions per program can be reduced by embedding the number of operations in a single instruction, thereby making the instructions more complex.

Characteristics of CISC Architecture:

- ① Instruction decoding logic will be complex
- ② One instruction is required to support multiple addressing modes.
- ③ Less chip space is enough for general purpose registers for instructions that are operated directly on memory.
- ④ CISC uses minimum possible instructions by implementing hardware and execute operations.

Advantages of CISC Architecture :-

- ① Microprogramming is easy to implement and less expensive than hard-wiring a control unit.
- ② The execution of single instruction will also execute and complete several low level tasks.
- ③ Memory requirement is minimized due to code size.
- ④ Memory locations can be directly accessed by CISC instructions.
- ⑤ If new commands are to be added to the chip, the structure of the instruction set does not need to be changed. This is because the CISC architecture uses general purpose hardware to carry out commands.

Disadvantages of CISC Architecture:

- ① Less efficient system due to requirement of several clock cycles to execute a single instruction.
- ② The implementation of Pipelining in CISC is regarded to be complicated.
- ③ In order to simplify the software, the hardware structure needs to be more complex.