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Question

Briefly explain each of the following architectures. 1. RISC 2. CISC 3. VLIW.

Answers

1. RISC (Reduced Instruction Set Computer)

A RISC is a computer instruction set that allows a computer's microprocessor to have fewer cycles per instruction than a complex instruction set computer. A RISC computer has a small set of simple and general instructions, rather than a large set of complex and specialized ones.
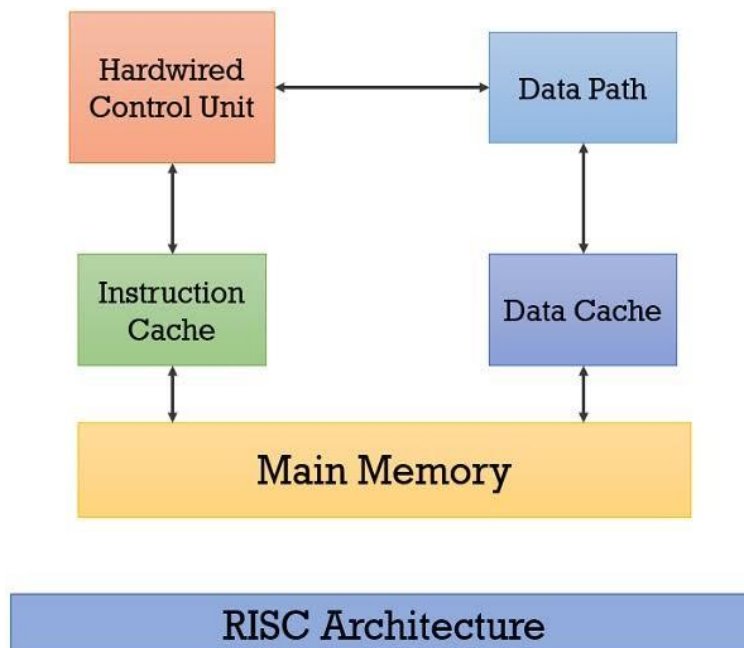
Characteristics of RISC architecture

- Simple instructions are used in RISC architecture.

- RISC helps and supports few simple data types and synthesizes complex data types.
- RISC utilizes simple addressing modes and fixed length instructions for pipelining.
- One cycle execution time.
- RISC permits any register to use in any context.

Advantages of RISC
- It allows freedom of using the space on microprocessors because of its simplicity.
- The speed of operation can be maximized and the execution time can be minimized.

Disadvantages of RISC
- While rearranging the CISC code to a RISC code, termed as a code expansion, will increase the size. And, the quality of this code expansion will again depend on the compiler, and also on the machine's instruction set.

2. CISC (Complex Instruction Set Computer)
Is a computer in which single instructions can execute several low-level operations or are capable of multi-step operations or addressing modes within single instruction.

The CISC approach attempts to minimize the number of instructions per program, sacrificing the number of cycles per instruction. Computer based on the CISC architecture are designed to decrease the memory cost. Because, the larger the programs need more storage, thus increasing the memory cost and large memory becomes more expensive.
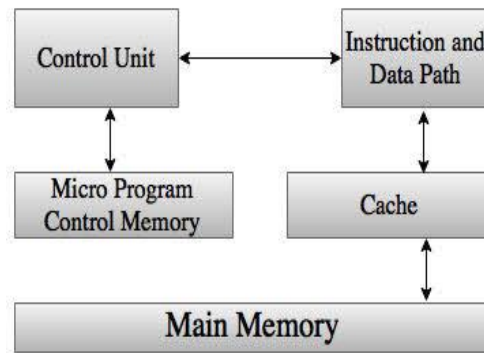
Fig. CISC Architecture

Characteristics of CISC architecture

- MUL is referred to as a ''complex instructor" and requires the programmer for storing functions.
- Instruction-decoding logic will be complex.
- One instruction is required to support multiple addressing modes.

Example of CISC processors

- IBM 370/168
- VAX 11/780
- Intel 80486

Comparison between RISC and CISC

CISC	RISC
It is prominent on Hardware	It is prominent on the Software
It has high cycle per second	It has low cycles per second
It has transistors used for storing instructions which are complex	More transistors are used for storing memory
LOAD and STORE memory-to-memory is induced in instructions	LOAD and STORE register-register are independent
It has multi-clock	It has a single clock

Advantages of CISC
- As each instruction became more accomplished, fewer instructions could be used to implement a given task.
- The ease of micro coding new instructions allowed designers to make CISC machines upwardly compatible.

Disadvantages of CISC
- The performance of the machine slows down due to the amount of clock time taken by different instructions will be dissimilar.

3. VLIW (Very Long Instruction Word)

It describes a computer processing architecture in which a language compiler or pre-processor breaks program instruction down into basic operations that can be performed by the processor in parallel.

VLIW Architecture