What is RISC?

A reduced instruction set computer is a computer that only uses simple commands that can be divided into several instructions that achieve low-level operation within a single CLK cycle, as its name proposes "Reduced Instruction Set".

The RISC is a Reduced Instruction Set Computer microprocessor and its architecture includes a set of instructions that are highly customized. **The main function of this is to reduce the time of instruction execution by limiting as well as optimizing the number of commands**. So each command cycle uses a single clock cycle where every clock cycle includes three parameters namely fetch, decode & execute.

The kind of processor is mainly used to execute several difficult commands by merging them into simpler ones. RISC processor needs a number of transistors to design and it reduces the instruction time for execution. The best examples of RISC processors include PowerPC, SUN's SPARC, RISC-V, Microchip PIC processors, etc.

RISC Architecture

The term RISC stands for ''Reduced Instruction Set Computer''. It is a CPU design plan based on simple orders and acts fast.

This is a small or reduced set of instructions. Here, every instruction is expected to attain very small jobs. In this machine, the instruction sets are modest and simple, which help in comprising more complex commands. Each instruction is of a similar length; these are wound together to get compound tasks done in a single operation. Most commands are completed in one machine cycle. This pipelining is a crucial technique used to speed up RISC machines.

Characteristics

The characteristics of RISC include the following.

- Pipeline architecture
- The number of instructions is restricted as well as decrease
- The instructions like load as well as store have right of entry to memory
- Addressing modes are less
- Instruction is uniform and its format can be simplified

Advantages

The advantages of the RISC processor include the following.

- The performance of this processor is good because of the easy & limited no. of the instruction set.
- This processor uses several transistors in the design so that making is cheaper.
- RISC processor allows the instruction to utilize open space on a microprocessor due to its simplicity.

- It is very simple as compared with another processor due to this; it can finish its task within a single clock cycle.

Disadvantages

The disadvantages of a RISC processor include the following.

- The performance of this processor may change based on the executed code because the next commands may depend on the earlier instruction for their implementation within a cycle.
- The complex instruction is frequently used by the compilers and programmers
- These processors need very quick memory to keep different instructions that use a huge collection of cache memory to react to the command within less time.

What is CISC?

It was developed by the Intel Corporation and it is Complex Instruction Set Computer. This processor includes a huge collection of simple to complex instructions. These instructions are specified in the level of assembly language level and the execution of these instructions takes more time.

A complex instruction set computer is a computer where single instructions can perform numerous low-level operations like a load from memory, an arithmetic operation, and a memory store or are accomplished by multi-step processes or addressing modes in single instructions, as its name proposes “Complex Instruction Set ”.

So, this processor moves to decrease the number of instructions on every program & ignore the number of cycles for each instruction. It highlights to assemble complex instructions openly within the hardware as the hardware is always as compared with software. However, CISC chips are relatively slower as compared to RISC chips but utilize small instruction as compare with RISC.

The best examples of the CISC processor include AMD, VAX, System/360 & Intel x86.

CISC Architecture

The term CISC stands for ‘’Complex Instruction Set Computer’’. It is a CPU design plan based on single commands, which are skilled in executing multi-step operations.

CISC computers have small programs. It has a huge number of compound instructions, which takes a long time to perform. Here, a single set of instructions is protected in several steps; each instruction set has additional than 300 separate instructions. Maximum instructions are finished in two to ten machine cycles. In CISC, instruction pipelining is not easily implemented.

Characteristics

The main characteristics of the RISC processor include the following.

- CISC may take more time to execute the code as compared with an only clock cycle.
- CISC supports high-level languages for simple compilation and complex data structure.
- It is collected with more addressing nodes, fewer registers normally from 5 to 20.
- For writing an application, less instruction is required
- The code length is very short, so it needs extremely small RAM.
- It highlights the instruction on hardware while designing as it is faster to design than the software.
- Instructions are larger as compared with a single word.
- It gives simple programming within assembly language.

Advantages

The **advantages of CISC** include the following.

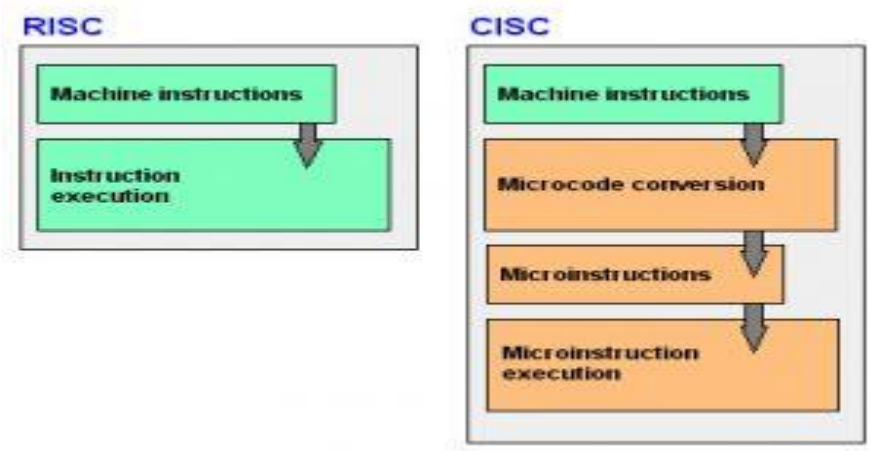
- This processor will create a procedure to handle the usage of power that regulates the speed of clock & voltage.
- In the CISC processor, the compiler needs a small effort to change the program or statement from high-level to assembly otherwise machine language.
- A single instruction can be executed by using different low-level tasks
- It doesn't use much memory due to a short length of code.
- CISC utilizes less instruction set to execute the same instruction as the RISC.
- The instruction can be stored within RAM on every CISC

Disadvantages

The disadvantages of CISC include the following.

- The existing instructions used by the CISC are 20% within a program event.
- As compared with the RISC processor, CISC processors are very slow while executing every instruction cycle on every program.
- This processor use number of transistors as compared with RISC.
- The pipeline execution within the CISC will make it difficult to use.
- The machine performance reduces because of the low speed of the clock.

Difference between RISC and CISC Architecture



Difference between RISC and CISC

RISC	CISC
1. RISC stands for Reduced Instruction Set Computer.	1. CISC stands for Complex Instruction Set Computer.
2. RISC processors have simple instructions taking about one clock cycle. The average clock cycle per instruction (CPI) is 1.5	2. CSIC processor has complex instructions that take up multiple clocks for execution. The average clock cycle per instruction (CPI) is in the range of 2 and 15.
3. Performance is optimized with more focus on software	3. Performance is optimized with more focus on hardware.
4. It has no memory unit and uses separate hardware to implement instructions..	4. It has a memory unit to implement complex instructions.
5. It has a hard-wired unit of programming.	5. It has a microprogramming unit.
6. The instruction set is reduced i.e. it has only a few instructions in the instruction set. Many of these instructions are very primitive.	**6.** The instruction set has a variety of different instructions that can be used for complex operations.
7. The instruction set has a variety of different instructions that can be used for complex operations.	**7.** CISC has many different addressing modes and can thus be used to represent higher-level programming language statements more efficiently.
8. Complex addressing modes are synthesized using the software.	8. CISC already supports complex addressing modes
9. Multiple register sets are present	9. Only has a single register set
10. RISC processors are highly pipelined	10. They are normally not pipelined or less pipelined

11. The complexity of RISC lies with the compiler that executes the program	11. The complexity lies in the microprogram
12. Execution time is very less	12. Execution time is very high
13. Code expansion can be a problem	13. Code expansion is not a problem
14. The decoding of instructions is simple.	14. Decoding of instructions is complex
15. It does not require external memory for calculations	15. It requires external memory for calculations
16. The most common RISC microprocessors are Alpha, ARC, ARM, AVR, MIPS, PA-RISC, PIC, Power Architecture, and SPARC.	16. Examples of CISC processors are the System/360, VAX, PDP-11, Motorola 68000 family, AMD, and Intel x86 CPUs.
17. RISC architecture is used in high-end applications such as video processing, telecommunications, and image processing.	17. CISC architecture is used in low-end applications such as security systems, home automation, etc.