**Comparison between RISC and CISC**

**Memory Unit**

RISC has no memory unit and uses a separate hardware to implement instructions. CISC has a memory unit to implement complex instructions

**Program**

RISC has a hard-wired unit of programming. CISC has a microprogramming unit

**Design**

RISC is a complex compiler design. CISC is an easy compiler design

**Calculations**

RISC calculations are faster and more precise. CISC calculations are slow and precise

**Decoding**

RISC decoding of instructions is simple. CISC decoding of instructions is complex

**Time**

Execution time is very less in RISC. Execution time is very high in CISC.

**External memory**

RISC does not require external memory for calculations. CISC requires external memory for calculations.

**Pipelining**

RISC Pipelining does function correctly. CISC Pipelining does not function correctly.

**Stalling**

RISC stalling is mostly reduced in processors. CISC processors often stall.

**Code Expansion**

Code expansion can be a problem in RISC whereas, in CISC, Code expansion is not a problem.

**Disc space**

Space is saved in RISC whereas in CISC space is wasted. The best examples of CISC instruction set architecture include VAX, PDP-11, Motorola 68k,And your desktop PCs on Intel’s x86 architecture, whereas the best examples of RISC architecture include DEC Alpha, ARC, AMD 29k, Atmel AVR, Intel i860, Blackfin, i960, Motorola 88000, MIPS, PA-RISC, Power, SPARC, SuperH, and ARM too.

#### Applications of RISC and CISC

RISC is used in high-end applications like video processing, telecommunications and image processing. CISC is used in low-end applications such as [security systems](https://edgefxkits.com/blog/luggage-security-alarm-system-applications/), home automation, etc

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| **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 a 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. 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. |