Control Unit (CU)

```
Some functions of the CU:
   - Determine what/where the next
     instruction must go for processing
   - Send clock signals to all hardware to
     force synchronous operations
   - Send memory taskings if appropriate
```

The Control Unit (CU) on a CPU receives information from the software; then, it distributes and directs the data to the relevant hardware components.

Complex Instruction Set Computers (CISC)

```
CISC Instructions Attributes:
   - Single instructions take more than one CPU
     cycle to complete
   - Instruction length varies based on the
     instruction type
   - Hardware must be designed to accept more
     complicated instructions
```

CISC (Complex Instruction Set Computer) is an ISA design practice that focuses on multi-step instructions and complex, power-consuming hardware. These designs primarily focus on hardware components and binary instruction complexity. Processing components are typically not interchangeable with RISC-designed systems.

Instruction Set Architectures

```
Some things an ISA defines:
   - How binary instructions are formatted
   - What instructions are available to be
     processed on a specific hardware setup
   - How computer memory, (volatile and
     non-volatile) is accessed
```

An Instruction Set Architecture (ISA) defines the communication rules between the hardware and software of the computer. The ISA is a design principle (conceptual) and not stored in a computer's memory.

Reduced Instruction Set Computers (RISC)

```
General RISC Instructions Attributes:
    - Single instructions take only one CPU
      cycle to complete
    - Instruction lengths are fixed, regardless
      of the instruction type
    - Reduced complexity of hardware leads to less
      power consumption at the expense of overall
      processing times.
```

RISC (Reduced Instruction Set Computer) is an ISA design practice of ISAs that focuses on simple, quickly executed instructions to improve efficiency and reduce power consumption. These designs primarily focus on simple hardware components and reducing binary instruction complexity. Processing components are typically not interchangeable with CISC-designed systems.

Arithmetic and Logic Unit (ALU)

```
Some ALU functions:
    - Addition & subtraction
    - Determining equality
    - AND/OR/XOR/NOR/NOT/NAND logic
      gates and more!
```

An Arithmetic Logic Unit (ALU) is a digital circuit used to perform arithmetic and logic operations. It is the fundamental building block of the CPU.

Computer Instructions

Computer instructions are written in binary, also known as machine code. Computer hardware operates on a series of these binary instructions through pulsating power signals that signify either `OFF` or `ON` based on the binary digits `0` and `1` respectively.

Registers

```
Functions of a register:
  - Store temporary data for immediate
    processing by the ALU
  - Hold "flag" information if an operation
    results in overflow or triggers other flags
  - Hold the location of the next instruction
    to be processed by the CPU
```

A register is a volatile memory system that provides the CPU with rapid access to information it is immediately using.