**Computer architecture:**

2.1

Central Processing Unit (CPU)

<http://en.wikipedia.org/wiki/Central_processing_unit>

Executes a sequence of stored instructions called a program. The program is represented by a series of numbers that are kept in some kind of [computer memory](http://en.wikipedia.org/wiki/Memory_%28computers%29).

There are four steps that nearly all CPUs use in their operation:

1. Fetch
2. Decode
3. Execute
4. Writeback
5. The first step, fetch, involves retrieving an [instruction](http://en.wikipedia.org/wiki/Instruction_%28computer_science%29) (which is represented by a number or sequence of numbers) from program memory. The location in program memory is determined by a [program counter](http://en.wikipedia.org/wiki/Program_counter) (PC), which stores a number that identifies the current position in the program. After an instruction is fetched, the PC is incremented by the length of the instruction word in terms of memory units
6. decode step, the instruction is broken up into parts that have significance to other portions of the CPU. The way in which the numerical instruction value is interpreted is defined by the CPU's instruction set architecture (ISA).[[8]](http://en.wikipedia.org/wiki/Central_processing_unit#cite_note-7) Often, one group of numbers in the instruction, called the opcode, indicates which operation to perform. The remaining parts of the number usually provide information required for that instruction, such as operands for an addition operation. Such operands may be given as a constant value (called an immediate value), or as a place to locate a value: a [register](http://en.wikipedia.org/wiki/Processor_register) or a memory address, as determined by some [addressing mode](http://en.wikipedia.org/wiki/Addressing_mode).
7. execute step is performed. During this step, various portions of the CPU are connected so they can perform the desired operation. If, for instance, an addition operation was requested, the [arithmetic logic unit](http://en.wikipedia.org/wiki/Arithmetic_logic_unit) (ALU) will be connected to a set of inputs and a set of outputs. The inputs provide the numbers to be added, and the outputs will contain the final sum. The ALU contains the circuitry to perform simple arithmetic and logical operations on the inputs (like addition and [bitwise operations](http://en.wikipedia.org/wiki/Bitwise_operations)). If the addition operation produces a result too large for the CPU to handle, an arithmetic overflow flag in a flags register may also be set.
8. The final step, writeback, simply "writes back" the results of the execute step to some form of memory. Very often the results are written to some internal CPU register for quick access by subsequent instructions. In other cases results may be written to slower, but cheaper and larger, [main memory](http://en.wikipedia.org/wiki/Random_access_memory). Some types of instructions manipulate the program counter rather than directly produce result data. These are generally called "jumps" and facilitate behavior like [loops](http://en.wikipedia.org/wiki/Control_flow#Loops), conditional program execution (through the use of a conditional jump), and [functions](http://en.wikipedia.org/wiki/Subroutine) in programs.[[9]](http://en.wikipedia.org/wiki/Central_processing_unit#cite_note-8) Many instructions will also change the state of digits in a "flags" register. These flags can be used to influence how a program behaves, since they often indicate the outcome of various operations.

Useful Links:

<http://my.safaribooksonline.com/book/electrical-engineering/computer-engineering/9788131760307/primary-memory/section_4.5#X2ludGVybmFsX0ZsYXNoUmVhZGVyP3htbGlkPTk3ODgxMzE3NjAzMDclMkZjaGFwdGVyXzM>=