

1. Software

Software is the general category of code which runs on the hardware that part of a computer system that **consists of encoded information or computer instructions**, in contrast to the physical **hardware** from which the system is built.

Computer software includes computer programs, libraries and related non-executable data, such as online documentation or digital media. Computer hardware and software require each other and neither can be realistically used on its own.

-----Wikipedia

软件指的是电脑要实现功能所使用的程序，一般分为操作系统、应用软件、辅助软件三大类，操作系统又叫 OS，如我们常用的 Windows 就是美国微软公司生产的软件，应用软件有我们做图用的 Photoshop 也是美国生产的软件，以及国产软件比较著名的：金山公司生产的 WPS office、金山词霸、金山快译、金山毒霸，瑞星公司、江民公司生产的杀毒软件等等。

2. Machine code

Machine code is a set of instructions **executed directly** by a computer's central processing unit (CPU). Each instruction performs a very specific task, such as a load, a jump, or an ALU operation on a unit of data in a CPU register or memory. Every program directly executed by a CPU is made up of a series of such instructions.

Machine code may be regarded as **the lowest-level (primitive) representation** of a compiled or assembled computer program and so on, comprising a long sequence of binary digital zeros and ones (**bits**).

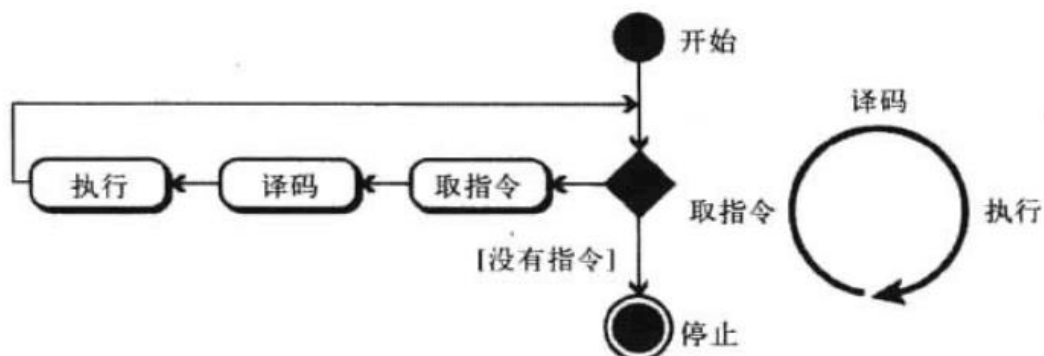
3. Instructions and Programs

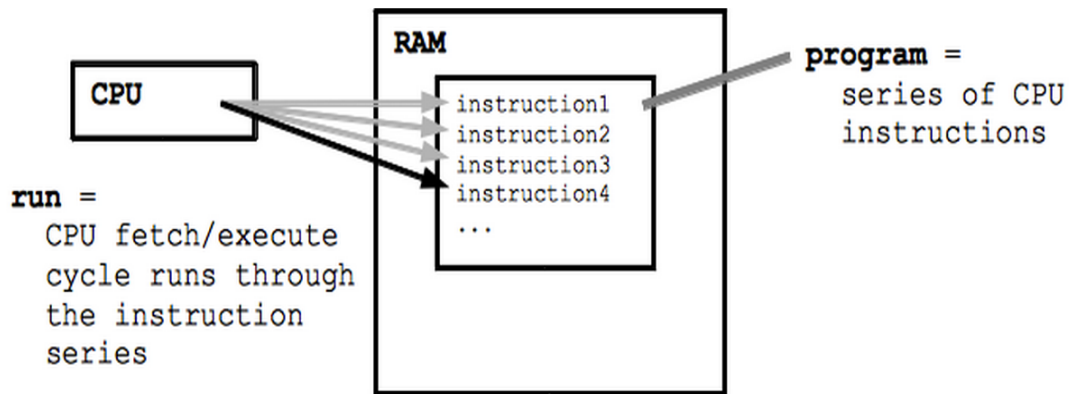
简单地说，**程序 (Programs)** 就是一组计算机**指令 (Instructions)** 序列。**指令 (Instructions)** 就是给计算机下达的一道命令，它告诉计算机每一步要做什么操作 (Operations)、参与此项操作的数据来自何处、操作结果又将送往哪里。

“Operations” there refers to these simple machine code instructions.

“Program” is made up of millions of simple machine code instructions

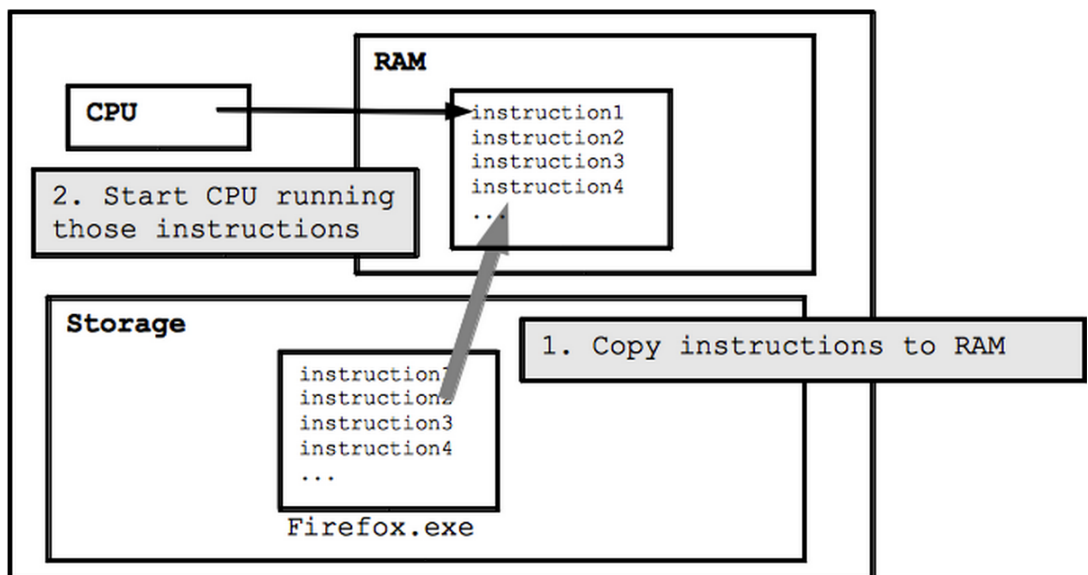
CPU 利用重复的机器周期来执行程序中的指令，**一步一条，从开始到结束**。一个简化的周期包括三步：取指令、译码和执行。





Double click Firefox.exe to Run

- The instruction bytes are copied up into RAM
- The CPU is directed to start running at the first instruction



4. Operating System

操作系统 (Operating System, 简称 OS) 是管理和控制计算机硬件与软件资源的计算机程序，是直接运行在“裸机”上的最基本的系统软件，任何其他软件都必须在操作系统的支持下才能运行。

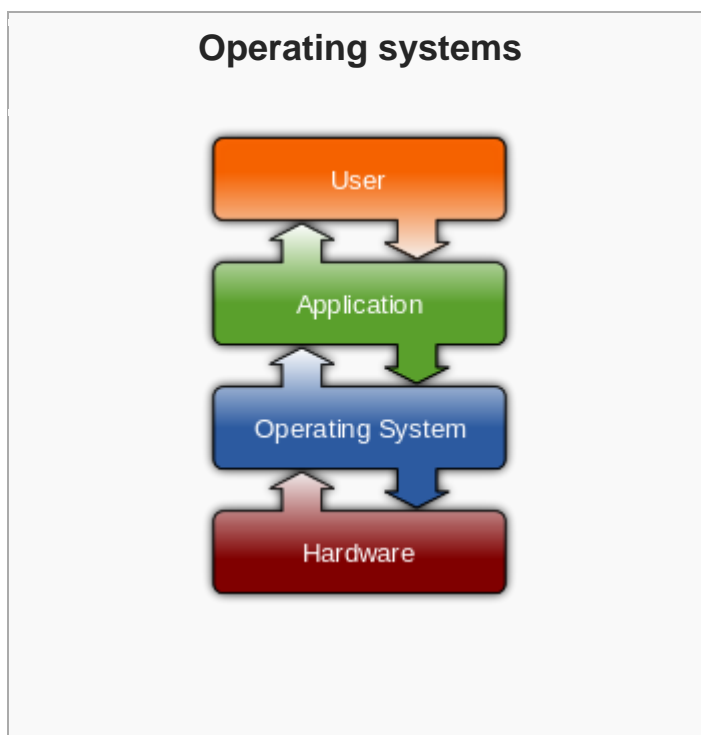
操作系统是用户和计算机的接口，同时也是计算机硬件和其他软件的接口。操作系统的功能包括管理计算机系统的硬件、软件及数据资源，控制程序运行，改善人机界面，为其它应用软件提供支持，让计算机系统所有资源最大限度地发挥作用，提供各种形式的用户界面，使用户有一个好的工作环境，为其它软件的开发提供必要的服务和相应的接口等。实际上，用户是不用接触操作系统的，操作系统管理着计算机硬件资源，同时按照应用程序的资源请求，分配资源。

-----百度百科

An operating system (OS) is system software that manages computer hardware and software resources and provides common services for computer programs. All

computer programs, excluding firmware, require an operating system to function.

----- Wikipedia



Operating System is consist of a set of supervisory programs, which run when computer first starts.

Recall that a .exe file or whatever is essentially just a file of machine code instructions. When you double-click the program, it is the **operating system** that "launches" the program, doing the housekeeping steps of allocating an area of memory within RAM for the program, loading the first section of the program's machine code into that memory, and finally directing the CPU to start running that code.

5. Boot / Reboot

In computing, **booting** (or booting up) is the initialization of a computerized system.

In computing, **rebooting** is the **process** by which a running computer system is **restarted**, either intentionally or unintentionally.

To reboot is to **restart** a computer and **reload the operating system**. The most common reasons to reboot are because the installation of new software or hardware requires it, or because applications are not responding for some reason.

----- Wikipedia

6. Computer Languages

计算机语言（Computer Language）指用于人与计算机之间通讯的语言。计算机语言是人与计算机之间传递信息的媒介。计算机系统最大特征是指令通过一种语言传达给机器。为了使电子计算机进行各种工作，就需要有一套用以编写计算机程序的数字、字符和语法规则，由这些字符和语法规则组成计算机各种指令（或各

种语句)。这些就是计算机能接受的语言。

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Computer language may refer to:

- **Programming language**, a **formal language** designed to communicate instructions to a machine, particularly a computer. (a programmer writes code in a more "high level" computer language with features that are more useful and powerful than the simple operations found in machine code) 'High level' computer languages have "C ,C++ ,Java, JavaScript"
- **Command language**, a language used to control the tasks of the computer itself, such as starting other programs
- **Machine language** or machine code, a set of instructions executed directly by a computer's central processing unit (It is extremely rare to write machine code by hand.)
- **Markup language**, a grammar for annotating a document in a way that is syntactically distinguishable from the text, such as HTML
- **Style sheet language**, a computer language that expresses the presentation of structured documents, such as CSS
- **Configuration language**, a language used to write **configuration files**
- **Construction language**, a general category that includes configuration languages, toolkit languages, and programming languages
- **Query language**, a language used to make queries in databases and information systems
- **Modeling language**, a formal language used to express information or knowledge, often for use in computer system design

----- Wikipedia

7. Source Code

源码就是指编写的最原始程序的代码。运行的软件是要经过编写的，程序员编写程序的过程中需要他们的“语言”。音乐家用五线谱，建筑师用图纸，那程序员的工作的语言就是“源码”了。

Programmer writes "source code" of a program in a language, say, C++ JavaScript

8. Compiler

A **compiler** is a computer program (or a set of programs) that **transforms source code written in a programming language (the source language) into another computer language (the target language)**, with the latter often having a binary form known as object code. The most common reason for converting source code is to create an executable program.

----- Wikipedia

编译器就是将“一种语言（通常为高级语言）”翻译为“另一种语言（通常为低级语言）”的程序。一个现代编译器的主要工作流程：源代码 (source code) → 预处理器 (preprocessor) → 编译器 (compiler) → 目标代码 (object code) → 链接器 (Linker) → 可执行程序 (executables)

高级计算机语言便于人编写，阅读交流，维护。机器语言是计算机能直接解读、运行的。编译器将汇编或高级计算机语言源程序 (Source program) 作为输入，翻译成目标语言 (Target language) 机器代码的等价程序。源代码一般为高级语言 (High-level language)，如 Pascal、C、C++、Java、汉语编程等或汇编语言，而目标则是机器语言的目标代码 (Object code)，有时也称作机器代码 (Machine code)。

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Example: The **Compiler** for the C++ language, reads that C++ code and translates and expands it to a larger sequence of the machine code instructions to implement the sequence of actions specified by the C++ code. The output of the compiler is, essentially, a program file (.exe or whatever) made of many machine code instructions that implements the actions specified in the C++ code. The compiler produces the .exe file from the C++ code, and it is finished. Running the .exe can happen later, and is a separate step.

9. **开放源代码软件** (open source software, 简称: Oss 或开源软件) 这种“公开”正是促使人们使用它的原因，因为这意味着用户可以自由的使用、复制、散发以及修改源码（补充漏洞，按具体需求定制功能）。与其相对是私有/专属软件，如来自微软和苹果的软件，这类软件的源代码是保密的，只有公司的开发人员才可以改动代码。

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10. Dynamic (interpreter) Languages

An **interpreted language** is a programming language for which most of its implementations execute instructions **directly, without previously compiling** a program into machine-language instructions. Dynamic languages, e.g. Java, JavaScript, Python.

11. Interpreters & Compilers

Interpreter

A program that reads a source program and produces the results of executing that program

Compiler

A program that translates a program from one language (the source) to another (the target)

A **compiler** translates **all the source code** into equivalent machine code program.exe to be run later -- it is a bulk translation.

An **interpreter** looks at **each line of code**, and **translates and runs it in the moment**, and **then proceeds to the next line of source code**. The interpreter does not produce a program.exe, instead it performs the actions specified in the source code directly.

12. Program Running

程序的编译

对于一个简单语言程序来说，一般要经过**预处理器、编译器、汇编器和链接器**的处理，才能被翻译成一段可执行的二进制文件。

