高等应用型人才培养规划教材

计算机专业英语

吴 强 主编
孟 立 邢理平 吕 冲 副主编

電子工業出版社
PUBLISHING HOUSE OF ELECTRONICS INDUSTRY http://www.phei.com.cn

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内 容 简 介

本书按计算机基础、计算机网络、计算机软件、电子商务四个部分编写，除涵盖计算机基础知识点外，还包括当前最新的技术和应用内容，如无线网络、Wiki 技术等。本书内容来自国外近期英文计算机方面的教材、培训资料、专著、使用说明书及网络信息，内容覆盖面广，题材新颖，实用性强，书中所附习题贴近实际英语需要，在重视学生阅读能力的基础上，着重培养学生实际应用计算机专业英语的能力。本书可作为高等院校和高等职业院校计算机相关专业的专业英语教材，也可供计算机专业工程技术人员学习参考。

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前　言

本书旨在让读者接触到纯正的计算机英语和最新的计算机发展动态，培养和提高读者对计算机专业英语文献、教科书及网上材料的阅读理解能力；通过书中的配套练习提高读者口头及书面的专业英语表达能力。

全书由 4 部分组成，共 12 章。第 1 部分为计算机基础，第 2 部分为计算机网络，第 3 部分为编程与软件工程，第 4 部分为电子商务。其中第 4、5、7、8、10、11 章多采用英文原版的教科书、讲义等，专业性及系统性较强，语言平实，较准确地反映了当前英文原版教材的英语难易程度；第 1、2、3、6、9、12 章选自文献、论文、网络等，浓缩了计算机最新技术及概念，语言风格多样，每一节自成一体，便于教师及学生选择性地进行教学和自学。

本书每一单元分为原文、生词与词组、注释及扩展学习 4 部分（扩展学习部分根据原文的情况而设立）。在注释中注意了在全书范围内的引用。如果一个重要的术语或语言点出现在单元中，则在本单元注释中，或提示读者到已经做过注释的单元里去参考。每章最后练习分为 3 部分：英译汉、口语练习和写作练习。授课教师可根据学生实际情况及学时安排选择性地布置。

本书解释较详细，文章涉及范围较广，可供大专院校作为计算机相关专业的专业英语教材，也可作为其他有志于学好计算机专业英语的读者自学。

本书由吴强、孟立策划，吴强负责文章的选材工作，有 4 位编者参与了本书的编写：郑州轻工业学院吴强、孟立、邢理平，北京第二外国语学院吕冲。邢理平编写第 1 章；吴强编写第 2、3、10、11、12 章；吕冲编写第 4 章；孟立编写第 5、6、7、8、9 章。编写的内容由 4 位编者进行了交叉互审。

在此感谢对本书编写给予帮助的外籍专家 John Sharp、Pete Edwards，华中科技大学石林岳，英国萨塞克斯大学马雪皎，郑州轻工业学院魏星、曹芳以及所有在本书编写过程中给予支持的家人和朋友。

由于作者水平有限，书中难免有不妥及错误之处，敬请读者批评指正。

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编者

2007 年 12 月

于郑州轻工业学院

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PART 1 Fundamentals of Computer

Chapter 1 Hardware

Unit 1.1 Computer Hardware

Computer hardware is the physical part of a computer, including the digital circuitry, as distinguished from the computer software that executes within the hardware[1]. The hardware of a computer is infrequently changed, in comparison with software and data, which are "soft" in the sense that they are readily created, modified or erased on the computer[2]. Firmware[3] is a special type of software that rarely, if ever, needs to be changed and so is stored on hardware devices such as Read-Only Memory (ROM) where it is not readily changed (and is, therefore, "firm" rather than just "soft").

Most computer hardware is not seen by normal users. It is in embedded systems in automobiles, microwave ovens, electrocardiograph machines, compact disc players and other devices. Personal computers, the computer hardware familiar to most people, form only a small minority of computers[4].

Computer hardware

A typical personal computer consists of a case or chassis in desktop or tower shape and the following parts(Figure 1.1):

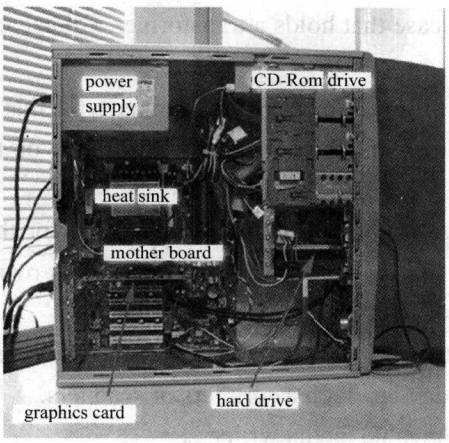

Figure 1.1 Internals of typical personal computer

- Motherboard or system board with slots for expansion cards and holding parts(Figure 1.2):
  - Central Processing Unit (CPU)

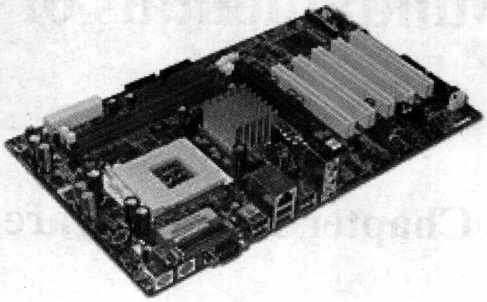

Figure 1.2 Typical Motherboard found in a computer

  - Computer fan — used to cool down the CPU.
  - Random Access Memory (RAM) — for program execution and short term data storage, so the computer does not have to take the time to access the hard drive to find the file(s) it requires[5]. More RAM will normally contribute to a faster PC. RAM is almost always removable as it sits in slots in the motherboard, attached with small clips. The RAM slots are normally located next to the CPU socket.
  - Firmware — usually Basic Input-Output System (BIOS) based or in newer systems Extensible Firmware Interface (EFI) compliant.
  - Buses:
    - PCI
    - USB
    - Hyper Transport
    - AGP
    - ISA (outdated)
    - EISA (outdated)
- Power supply — a case that holds a transformer, voltage control, and (usually) a cooling fan.
- Storage controllers of IDE, SATA, SCSI or other type, that control hard disk, floppy disk, CD-ROM and other drives; the controllers sit directly on the motherboard (on-board) or on expansion cards.
- Video display controller — that produces the output for the computer display. This will either be built into the motherboard or attached in its own separate slot (PCI, or AGP), requiring a graphics card.
- Computer bus controllers (parallel, serial, USB, FireWire) to connect the computer to external peripheral devices such as printers or scanners.
- Some types of a removable media writer[6]:
  - CD — the most common type of removable media, cheap but fragile.

- CD-ROM Drive
- CD Writer

○ DVD

- DVD-ROM Drive
- DVD Writer

○ Floppy disk

○ USB flash drive, memory stick

○ Tape drive — mainly for backup and long-term storage.

➢ Internal storage — keeps data inside the computer for later use.

○ Hard disk — for medium-term storage of data.

○ Disk array controller

➢ Sound card — translates signals from the system board into analog voltage levels, and has terminals to plug in speakers.

➢ Networking — to connect the computer to the Internet and/or other computers.

○ Modem — for dial-up connections.

○ Network card — for DSL/Cable internet, and/or connecting to other computers.

➢ Other peripherals

In addition, hardware can include external components of a computer system. The following are either standard or very common.

➢ Input devices

○ Text input devices

- Keyboard

○ Pointing devices

- Mouse(Figure 1.3)
- Trackball

○ Gaming devices

- Joystick
- Gamepad
- Game controller

○ Image, Video input devices

- Image scanner
- Webcam

○ Audio input devices

- Microphone

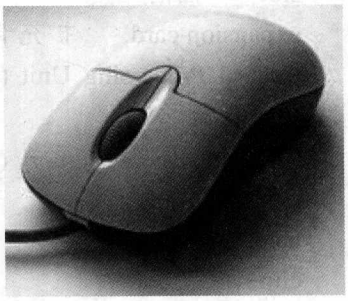

Figure 1.3 Wheel Mouse

➢ Output devices

○ Image, Video output devices

- Printer — peripheral device that produces a hard copy. (Inkjet, Laser)
- Monitor — device that takes signals and displays them. (CRT, LCD)

○ Audio output devices

- Speakers — a device that converts analog audio signals into the equivalent air vibrations in order to make audible sound.
- Headset — a device similar in functionality to computer speakers used mainly to not disturb others nearby.

Keywords and Expressions

digital circuitry 数字电路
execute 执行，实行，完成
firmware 固件，韧件
Read-Only Memory（ROM） 只读存储器
embedded 嵌入的，内含的
electrocardiograph 心电图仪，心动电流描记器
compact disc CD 光盘
case 箱子，盒子
chassis 底盘，底架
motherboard 主板
slot 插槽
expansion card 扩充卡
Central Processing Unit (CPU) 中央处理器
Random Access Memory (RAM) 随机存取存储器
hard drive 硬盘
clip 夹子
socket 孔，插座，插槽
Basic Input-Output System (BIOS) 基本输入/输出系统（见 Extended Study）
Extensible Firmware Interface (EFI) 可扩展固件接口
compliant 顺从的，适应的
bus 数据传送总线，总线，母线
PCI（Peripheral Component Interface） 周边元件扩展接口
USB (Universal Serial Bus) 通用串行总线
HyperTransport 超传输（一种为主板上的集成电路互连而设计的端到端总线技术）
AGP (Accelerated Graphics Port) 图形加速接口
transformer 变压器
IDE（Integrated Device Electronics） 集成设备电路
SATA（Serial Advanced Technology Attachment） 串行 ATA 接口
SCSI (Small Computer Systems Interface) 小型计算机系统接口
floppy disk 软盘
CD-ROM 光驱
graphics card 图形卡
parallel 并行的（见 Extended Study）
serial 串行的（见 Extended Study）
firewire 火线（接口）（见 Extended Study）
peripheral device 外围设备
printer 打印机
scanner 扫描仪
array 排列
sound card 声卡
analog 类似物，相似体
terminal 终端
speaker 扬声器，音箱
modem 调制解调器
dial-up 拨号
DSL (Digital Subscriber Line) 数字用户线路
pointing devices 指点设备
trackball 轨迹球
joystick 操纵杆

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gamepad　游戏控制面板
game controller　游戏控制器
webcam　网络摄像头
CRT (Cathode Ray Tube)　阴极射线管显示器
LCD（Liquid Crystal Display）液晶显示器
vibration　振动
audible　听得见的
headset　（头戴式）耳机

Notes

[1] distinguish 意为“区分，辨别”，英文释义为：to perceive as being different or distinct，常与 from 连用。如 The twins are so alike that it's difficult to distinguish one from the other.（这对双胞胎太像了，很难区分。）此处，as 引导方式状语从句，表示“正如……”。execute 的意思是“执行，完成”，和 do, perform, carry out, implement 意思相近，此处表示 to run (a program or an instruction)，即“执行（程序或命令）”。本句话的意思是：计算机硬件系统是计算机的物理部分，包括数字电路，有别于在硬件内部执行程序的计算机软件系统。

[2] in comparison with 意为“与……进行比较”；in the sense 意为“在某种意义上，在某种程度上”，通常的形式是 in a sense 或 in some senses，此处因后面有 that 从句，因此以 in the sense 形式出现。如 You are right in a sense, but you don't know all the facts.（在某种意义上你是对的，但你不了解全部事实。）readily 在此处的英文含义是 quickly and easily。如 Computers make data readily available to users.（计算机使用户能够快速容易地获取数据。）本句话意为：与软件和数据相比，计算机的硬件很少变动，而软件之所以“软”是由于它们易于在计算机上创造、修改和删除。

[3] firmware 意为“固件，韧件，存在于只读存储器中而不通过软件来执行的编程命令”。

[4] minority 意为“少数”，与 majority（多数）相对。a small minority of 相当于 a tiny part of。因此本句的意思是：个人电脑，大多数人所熟悉的计算机硬件，只是构成了计算机的很少一部分。

[5] execution 是 execute（见 Notes [1]）的名词形式。short-term（短期的），与 temporary 相近，与 long-term 相对。access 在这里是动词，表示 to obtain access to（data or processes）（接近，进入，获得接触（数据或程序）的途径）。本句的意思是：随机存取存储器（RAM）的作用是执行程序和短期的数据存储，这样计算机就不需花时间进入硬盘搜寻所需文件。

[6] writer 在这里不是“作家，作者”的意思。在计算机的数据访问中，对存储媒质的访问方式有 read（读）和 write（写）两种；读动作是从媒质上获得数据，写动作是向媒质上写入数据。对于硬盘或闪存这些存储媒质来说，它们本身就具有读、写的两种功能。但对于 CD、DVD 这些存储媒质而言，就分为 read-only（只读）和 writable（可写）两种，因此对能够向 CD、DVD 媒质写入数据的设备被称做 writer，所以其中文译为“刻录机”，和另外一个英文单词 burner 可以换用，比如 CD-writer，DVD-burner。

Extended Study

Basic Input-Output System (BIOS)

Acronym for basic input/output system, the built-in software that determines what a computer can do without accessing programs from a disk. On PCs, the BIOS contains all the code required to control the keyboard, display screen, disk drives, serial communications and a number of miscellaneous functions.

The BIOS is typically placed in a ROM chip that comes with the computer (it is often called a ROM BIOS). This ensures that the BIOS will always be available and will not be damaged by disk failures. It also makes it possible for a computer to boot itself. Because RAM is faster than ROM, though, many computer manufacturers design systems so that the BIOS is copied from ROM to RAM each time the computer is booted. This is known as shadowing. Many modern PCs have a flash BIOS, which means that the BIOS has been recorded on a flash memory chip, which can be updated if necessary.

The PC BIOS is fairly standardized, so all PCs are similar at this level (although there are different BIOS versions). Additional DOS functions are usually added through software modules. This means you can upgrade to a newer version of DOS without changing the BIOS.

PC BIOSes that can handle Plug-and-Play (PnP) devices are known as PnP BIOSes, or PnP-aware BIOSes. These BIOSes are always implemented with flash memory rather than ROM.

Parallel

Refers to processes that occur simultaneously. Printers and other devices are said to be either parallel or serial. Parallel means the device is capable of receiving more than one bit at a time (that is, it receives several bits in parallel). Most modern printers are parallel.

Serial

One by one. Serial data transfer refers to transmitting data one bit at a time. The opposite of serial is parallel, in which several bits are transmitted concurrently.

Firewire

IEEE 1394. A very fast external bus standard that supports data transfer rates of up to 400Mbps (in 1394a) and 800Mbps (in 1394b). Products supporting the 1394 standard go under different names, depending on the company. Apple, which originally developed the technology, uses the trademarked name FireWire. Other companies use other names, such as i.link and Lynx, to describe their 1394 products.

A single 1394 port can be used to connect up 63 external devices. In addition to its high speed, 1394 also supports isochronous data — delivering data at a guaranteed rate. This makes it ideal for devices that need to transfer high levels of data in real-time, such as video devices.

Although extremely fast and flexible, 1394 is also expensive. Like USB, 1394 supports both Plug-and-Play and hot plugging, and also provides power to peripheral devices.

Unit 1.2 Computer Architecture

A typical vision of a computer architecture is a series of abstraction layers: hardware, firmware, assembler, kernel, operating system and applications.

In computer engineering, computer architecture is the conceptual design and fundamental operational structure of a computer system(Figure 1.4). It is a blueprint and functional description of requirements (especially speeds and interconnections) and design implementations for the various parts of a computer — focusing largely on the way by which the central processing unit (CPU) performs internally and accesses addresses in memory[1].

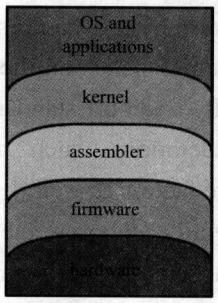

Figure 1.4 A typical vision of a computer architecture

It may also be defined as the science and art of selecting and interconnecting hardware components to create computers that meet functional, performance and cost goals.

Computer architecture comprises at least three main subcategories.

- Instruction set architecture, or ISA, is the abstract image of a computing system that is seen by a machine language (or assembly language) programmer, including the instruction set, memory address modes, processor registers and address and data formats.
- Microarchitecture, also known as computer organization is a lower level, more concrete, description of the system that involves how the constituent parts of the system are interconnected and how they interoperate in order to implement the ISA[2]. The size of a computer's cache for instance, is an organizational issue that generally has nothing to do with [3] the ISA.
- System design which includes all of the other hardware components within a computing system such as:

  1. system interconnects such as computer buses and switches;
  2. memory controllers and hierarchies;
  3. CPU off-load mechanisms such as direct memory access;
  4. issues like multi-processing.

Once both ISA and microarchitecture has been specified, the actual device needs to be designed into hardware. This design process is often called implementation. Implementation is usually not considered architectural definition, but rather hardware design engineering.

Implementation can be further broken down into three pieces:

- Logic Implementation/Design — where the blocks that were defined in the microarchitecture are implemented as logic equations.
- Circuit Implementation/Design — where speed critical[4] blocks or logic equations or logic gates are implemented at the transistor level.
- Physical Implementation/Design — where the circuits are drawn out, the different circuit components are placed in a chip floor-plan or on a board and the wires connecting them are routed.

For CPUs, the entire implementation process is often called CPU design.

More specific usages of the term include more general wider-scale hardware architectures, such as cluster computing and Non-Uniform Memory Access (NUMA) architectures.

The exact form of a computer system depends on the constraints and goals for which it was optimized. Computer architectures usually trade off standards, cost, memory capacity, latency and throughput[5]. Sometimes other considerations, such as features, size, weight, reliability, expandability and power consumption are factors as well[6].

The most common scheme carefully chooses the bottleneck[7] that most reduces the computer's speed. Ideally, the cost is allocated proportionally to assure that the data rate is nearly the same for all parts of the computer, with the most costly part being the slowest[8]. This is how skillful commercial integrators optimize personal computers.

Computer performance is often described in terms of clock speed (usually in MHz or GHz)[9]. This refers to the cycles per second of the main clock of the CPU[10]. However, this metric is somewhat misleading, as a machine with a higher clock rate may not necessarily have higher performance. As a result manufacturers have moved away from clock speed as a measure of performance. Computer performance can also be measured with the amount of cache a processor contains. If the speed, MHz or GHz, were to be a car, then the cache is the traffic light. No matter how fast the car goes, it still will not hit that green traffic light. The more speed you have and the more cache you have the faster your processor is.

Modern CPUs can execute multiple instructions per clock cycle, which dramatically speeds up a program[11]. Other factors influence speed, such as the mix of functional units, bus speeds, available memory, and the type and order of instructions in the programs being run.

There are two main types of speed, latency and throughput. Latency is the time between the start of a process and its completion. Throughput is the amount of work done per unit time. Interrupt latency is the guaranteed maximum response time of the system to an electronic event (e.g. when the disk drive finishes moving some data)[12]. Performance is affected by a very wide range of design choices — for example, adding cache usually makes latency worse (slower) but makes throughput better. Computers that control machinery usually need low interrupt latencies. These computers operate in a real-time environment and fail if an operation is not completed in a specified amount of time. For example, computer-controlled anti-lock brakes must begin braking almost immediately after they have been instructed to brake.

The performance of a computer can be measured using other metrics, depending upon its

application domain. A system may be CPU bound (as in numerical calculation), I/O bound (as in a webserving application) or memory bound (as in video editing). Power consumption has become important in servers and portable devices like laptops[13].

Benchmarking tries to take all these factors into account[14] by measuring the time a computer takes to run through a series of test programs. Although benchmarking shows strengths, it may not help one to choose a computer. Often the measured machines split on different measures. For example, one system might handle scientific applications quickly, while another might play popular video games more smoothly. Furthermore, designers have been known to add special features to their products, whether in hardware or software, which permit a specific benchmark to execute quickly but which do not offer similar advantages to other, more general tasks[15].

Power consumption is another design criteria that factors in the design of modern computers. Power efficiency can often be traded for performance or cost benefits[16]. With the increasing power density of modern circuits as the number of transistors per chip scales (Moore's Law), power efficiency has increased in importance. Recent processor designs such as the Intel Core 2 put more emphasis on increasing power efficiency. Also, in the world of embedded computing, power efficiency has long been and remains the primary design goal next to[17] performance.

Keywords and Expressions

architecture 体系结构（见 Extended Study）
abstraction layer 抽象层
assembler 汇编程序
kernel 核心，内核
operating system(OS) 操作系统
application 应用程序
conceptual 概念上的
blueprint 蓝图，规划
interconnection 互连
implementation 执行，实现
access 存取
subcategory 子种类，子范畴
Instruction set architecture (ISA) 指令集架构
machine language 机器语言（见 Extended Study）
assembly language 汇编语言（见 Extended Study）
instruction set 指令集
register 寄存器
format 格式
microarchitecture 微体系结构
constituent 组成的，构成整体的一部分的
cache 缓冲存储器，缓存
switch 开关
memory controller 存储控制器
hierarchy 层次，等级
off-load 卸载
break down into 分成
block 块
equation 方程，等式
logic gate 逻辑门
transistor 晶体管
chip floor-plan 芯片平面设计图
cluster computing 集群计算
Non-Uniform Memory Access (NUMA) 非一致性存储结构
constraint 约束
optimize 使优化
latency the time it takes for a specific

block of data on a data track to rotate around to the read/write head 时延，等待时间

throughput 吞吐量，通过量

expandability 扩展性

consumption 消耗

proportionally 成比例地，按比例地

data rate 数据率，数据传输速率

metric 度量，衡量标准

interrupt 中断（见 Extended Study）

real-time environment 实时环境

brake 刹车，制动器

domain 域

bound 受约束的

I/O (Input/Output) 输入/输出

webserving 网络服务

benchmark 基准测试（见 Extended Study）

criteria 标准

scale 规模

Moore's law 摩尔定律（见 Extended Study）

Notes

[1] blueprint 原意是指“建筑上的规划或技术图纸”，现常用来表示 a general plan for achieving something（实现某个目标的总体计划），如 a blueprint for the reform of the tax system（税收改革的总体规划）。focus on 意为“以……为焦点，集中”，同义的表达还有 concentrate on, center on 等。此句的意思是：它是各种要求（特别是速度和互连）的总体规划和功能描述，计算机各部分的设计实现方式——主要集中在中央处理器(CPU)的内部运行和在内存中的存取地址的方式。

[2] 注意 interconnect 和 interoperate 中都含有 inter-，作为词缀，它最常用的含义有两个：between, among（在……之间，在……之中），如 international（国际的）；mutual, mutually（相互的，相互地），如 interrelate（相互联系）。在这里它表示后者：interconnect (connect each other，互连)，interoperate (互操作)。此句的意思是：微体系结构，也叫做计算机结构，是对计算机系统的更具体和更低层次的描述，包括系统组成部分是怎样互联的，以及各部分间是如何互操作以实现指令集架构的。

[3] have nothing to do with 意为“与……无关”，相当于 not connected with，not related with/to 等，如 Our decision has nothing to do with the fact that her father is on the committee.（我们的决定与她父亲是委员会成员毫无关系。）

[4] critical 的含义很多，包括“挑剔的，危急的，关键的”等。在这里与 speed 构成复合形容词，表示对速度要求高的。

[5] trade off 的含义是 to balance one situation or quality against another in order to produce an acceptable result，即“权衡、折中（以达到理想的结果）”。如 The company is prepared to trade off its up-market image against a stronger appeal to teenage buyers.（该公司拟改变只售高档商品的形象，以吸引青少年顾客。）本句的意思是：计算机体系结构系统通常要综合考虑设计标准、成本、存储量、时延和吞吐量。

[6] as well 表示 in addition，“也，又”，注意它和 as well as 用法的区别。试比较：Often life is much slower outside the big cities, as is true in other countries as well.（大都市外面的生活步调往往缓慢得多，这在其他国家也是如此。）The tournament is

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